

## ONLINE SUPPLEMENTARY DOCUMENT

**Title:** Adverse childhood experiences and risk of diabetes: a systematic review and meta-analysis

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**Table S1.** Search strategy

<b>Database</b>	<b>Search terms</b>	<b>Results</b>
<b>PubMed</b>	#1 ("ACE"[Title/Abstract] OR "ACEs"[Title/Abstract] OR "adverse childhood experience*"[Title/Abstract] OR "adverse childhood event*"[Title/Abstract] OR "childhood adversit*"[Title/Abstract]) AND "diabet*"[Title/Abstract] AND 2000/01/01:3000/12/31[Date - Publication]) AND (humans[Filter])	3,354
<b>Medline</b>	#1 exp Diabetes Mellitus/	475,965
	#2 Diabet*.ab,ti.	708,214
	#3 1 or 2	772,492
	#4 (ACE or ACEs or adverse childhood experience* or adverse childhood event* or childhood adversity*).ab,ti.	42,171
	#5 3 and 4	5,249
	#6 limit 5 to humans	4,332
	#7 limit 6 to yr="2000 -Current"	3,383
	#8 limit 7 to journal article	3,313
<b>Embase</b>	#8 #7 AND ([article]/lim OR [article in press]/lim)	3,144
	#7 #6 AND [2000-2021]/py	7,349
	#6 #5 AND [humans]/lim	8,484
	#5 #3 AND #4	9,957
	#4 'ACE':ab,ti or 'ACEs':ab,ti or 'adverse childhood experience*':ab,ti or 'adverse childhood event*':ab,ti or 'childhood adversit*':ab,ti	63,408
	#3 #1 or #2	1,326,704
	#2 'Diabet*':ab,ti	1,084,826
	#1 'Diabetes Mellitus'/exp	1,139,377

**Table S2.** Characteristics of included studies (n=49)

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
Goodwin, et al. (2004)(1)	US	Cross-sectional	5,877	Male and Female	Range:15-54	Physical abuse, sexual abuse, neglect	Self-reported diabetes diagnosis (based on a checklist of physical illnesses)	Diabetes	No	Yes
Thomas, et al. (2008)(2)	UK	Cohort	9,310	Male and Female	At 45 years	Emotional neglect, physical neglect, household dysfunction, abuse	Self-reported T2DM diagnosis	T2DM	No	Yes
Alastalo, et al. (2009)(3)	Finland	Cohort	2,003	Male and Female	Mean±SD:63.7±2.8(war evacuees), 61.1±2.8(non-separated controls)	War evacuees, separated	Use of medication for chronic, physician-diagnosed diseases (diabetes), a 2-hour 75-g oral glucose tolerance	T2DM	No	Yes
Ramiro, et al. (2010)(4)	Philippines	Cross-sectional	1,068	Male and Female	Range:35-92	Childhood abuse (psychological/emotional abuse, physical abuse, sexual abuse, physical neglect, psychological neglect), household dysfunction (illicit drug use, alcohol abuse, mental illness, mother treated)	Self-rated health	Diabetes	Yes	No

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
Rich-Edwards, et al. (2010)(5)	US	Cohort	67,853	Female	Baseline: at 25–42 years in 1989, follow up to 2005	violently, incarcerated household member, parental separation or divorce) Physical abuse, sexual abuse	Self-reported T2DM diagnosis	T2DM	No	Yes
Anda, et al. (2010)(6)	US	Cross-sectional	7,471	Male and Female	Range:18+	Physical abuse, sexual abuse, verbal abuse, household mental illness, household substance abuse, parental divorce/separation, witnessed domestic violence, incarcerated household member	Self-reported diabetes diagnosis	Non-GDM	Yes	Yes
Scott, et al. (2011)(7)	Mexico,US, Belgium,France,Germany,Italy,Netherlands,Spain,Japan,Columbia	Cross-sectional	18,303	Male and Female	Range:18+	Physical abuse, sexual abuse, neglect, parental death, parental divorce, other parental loss, parental mental disorder, parental substance use, parental criminal behavior, family violence, family economic adversity	Self-reported diabetes diagnosis	Diabetes	Yes	Yes
Widom, et al. (2012)(8)	US	Cohort	1,575	Male and Female	Mean:41.2	Physical abuse, sexual abuse, neglect	Physical examination	Diabetes	No	Yes
Lynch, et al.	US	Cross-section	801	Male and	Range:19-82	Abuse, neglect, household	Any T2DM diagnosis	T2DM	Yes	No

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
(2013)(9)		al		Female		dysfunction	(based on clinical chart diagnoses)			
Ye, et al. (2014)(10)	US	Cross-sectional	5,928	Male and Female	Range:18+	Family dysfunction (family member with mental illness, family member with substance abuse, family member in prison, family separation or divorce, witnessing domestic violence), abuse (physical abuse, verbal abuse, sexual abuse)	Self-reported diabetes diagnosis	Diabetes	Yes	Yes
McCauley, et al. (2015)(11)	US	Cross-sectional	36,485	Female	Mean±SE:50.5±1.14(Veteran), 49.4±0.18(Non-veteran)	Household dysfunction (parental mental illness, incarceration, domestic violence, divorce, alcohol abuse, and illicit substance use), childhood abuse (emotional abuse, physical abuse, touched sexually, forced to touch someone else sexually, or forced to have sex)	Diagnosis by a health care professional of diabetes	Diabetes	Yes	No
Gilbert, et al. (2015)(12)	US	Cross-sectional	53,998	Male and Female	Range:18+	Physical abuse, sexual abuse, emotional abuse, and household member mental illness, alcoholism, drug abuse,	Self-reported non-gestational diabetes diagnosis	Non-GDM	Yes	No

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
						imprisonment, divorce, intimate partner violence				
McCorry, et al. (2015)(13)	Ireland	Cross-sectional	6,912	Male and Female	Range:50+	Disadvantaged socioeconomic circumstances, parental substance abuse, physical abuse, sexual abuse	Self-reported diabetes diagnosis	Diabetes	Yes	Yes
Bellis, et al. (2015)(14)	UK	Cross-sectional	3,885	Male and Female	Range:18-69	Physical abuse, verbal abuse, sexual abuse, parental separation, exposure to domestic violence and growing up in a household with mental illness, alcohol abuse, drug abuse or incarceration	Self-reported T2DM diagnosis	T2DM	Yes	No
Friedman, et al. (2015)(15)	US	Cross-sectional	3,996	Male and Female	Range:25-74	Academic, interpersonal, physical/sexual abuse, work or financial problems, death or illness of a loved one, legal problems, and parental substance abuse	Self-reported diabetes diagnosis	Diabetes	Yes	Yes
							Physical examination			

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
Duncan, et al. (2015)(16)	US	Cohort	14,493	Male and Female	Range:24-34	Sexual abuse, physical abuse, neglect	abuse,and/or self-report of previous diabetes diagnosis by a doctor	Diabetes	No	Yes
Monnat, et al. (2015)(17)	US	Cross-sectional	52,250	Male and Female	Range:18-64	Physical abuse, sexual abuse, verbal abuse, witnessing parental domestic violence, experiencing parental divorce, living with anyone who was depressed, mentally ill or suicidal, living with anyone who was a problem drinker or alcoholic, living with anyone who abused drugs, living with anyone who was incarcerated	Self-reported diabetes diagnosis	Diabetes	No	Yes
Almuneef, et al. (2016)(18)	Saudi Arabia	Cross-sectional	10,156	Male and Female	Range:18-88	Family dysfunction, physical, sexual and emotional abuse and neglect by parents or caregivers, peer violence, witnessing community violence, and exposure to collective violence	Received a medical diagnosis of diabetes	Diabetes	Yes	No

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
Campbell, et al. (2016)(19)	US	Cross-sectional	48,526	Male and Female	Range:18+	Physical abuse, sexual abuse, verbal abuse, parental substance abuse, lived with mentally ill, domestic violence	Self-reported diabetes diagnosis	Diabetes	Yes	Yes
Wade Jr, et al. (2016)(20)	US	Cross-sectional	1,784	Male and Female	Range:18-97 Baseline: at 25-42 years in 1989, follow up to 2001 and 2009	Conventional ACE (physical abuse, sexual abuse, emotional abuse, emotional neglect, physical neglect, substance abuse in the home, mentally ill household member, domestic violence, and household member in prison), Expanded ACE (experiencing racism, witnessing violence, bullying, experiencing foster care, and living in unsafe neighborhoods)	Self-reported diabetes diagnosis	Diabetes	Yes	Yes
Mason, et al. (2016)(21)	US	Cohort	45,550	Female		Physical abuse, sexual abuse	Any GDM diagnosis (based on medical record)	GDM	No	Yes



Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
Ford, et al. (2016)(22)	UK	Cross-sectional	5,621	Male and Female	Range:18-69	Sexual abuse, physical abuse, verbal abuse, parental separation, mental illness, alcohol abuse, drug abuse, incarceration	Not reported	T2DM	Yes	No
Shields, et al. (2016)(23)	Canada	Cross-sectional	21,878	Male and Female	Range:18+	Physical abuse, sexual abuse, intimate partner violence	Self-reported diabetes diagnosis	Diabetes	No	Yes
Wade, et al. (2017)(24)	US	Cross-sectional	71,413	Male and Female	Range:18+	Household stressors (parental separation/divorce, household alcoholism, household mental illness, domestic violence in the home, household illicit or prescription drug use, incarcerated household member), abuse (emotionally abused, physically abused, touched sexually, forced to touch sexually, forced to have sex)	Self-reported diabetes diagnosis	Diabetes	Yes	Yes
Llabre, et al. (2017)(25)	US	Cohort	5,117	Male and Female	Range:18-74	Emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, parental separation or divorce, witnessing female parent being	Physical examination and/or self-report of previous diabetes diagnosis by a doctor	Diabetes	Yes	No

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
Chanlongbutra, et al. (2018)(26)	US	Cross-sectional	79,810	Male and Female	Range:18+	abused, living with a substance abuser, living with a mentally ill person, imprisonment of a household member  Household dysfunction (parental mental illness, incarceration, domestic violence, divorce, alcohol abuse, illicit substance use), childhood abuse (emotional abuse, physical abuse, touched sexually, forced to touch someone else sexually, or forced to have sex)	Self-reported health care professional diagnosis	Diabetes	Yes	No
Lown, et al. (2019)(27)	US	Cohort	8,377	Male and Female	Range:14-56	Childhood poverty, parental death, adverse living situation, living with a mentally ill person, living with a problem drinker, being physically abused as a child	Self-reported T2DM diagnosis	T2DM	Yes	Yes
Amemiya, et al. (2019)(28)	Japan	Cross-sectional	13,123	Male and Female	Range:65-74	Parental divorce, witness of domestic violence or physical abuse, financial difficulties in the family	Self-reported diabetes diagnosis	Diabetes	Yes	Yes

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
Amemiya, et al. (2019)(28)	Finland	Cohort	10,353	Male and Female	Mean±SD:64.4±2.9	Parental divorce, fear of a family member, financial difficulties in the family	Any diabetes diagnosis (based on records in national health registers)	Diabetes	Yes	Yes
Carrillo-Vega, et al. (2019)(29)	Mexico	Cross-sectional	8,848	Male and Female	Range:50-80	No shoes during childhood, went to bed hungry before 10 years	Self-reported diabetes diagnosis	Diabetes	No	Yes
Felitti, et al. (2019)(30)	US	Cohort	9,508	Male and Female	Range:19+	Psychological abuse, physical abuse, sexual abuse, violence against mother, or living with household members who were substance abusers, mentally ill or suicidal, or ever imprisoned	Self-reported diabetes diagnosis	Diabetes	Yes	No
Merrick, et al. (2019)(31)	US	Cross-sectional	144,017	Male and Female	Range:18+	Physical abuse, emotional abuse, sexual abuse, household member substance misuse, incarceration, mental illness, parental divorce, or witnessing intimate partner violence	Self-reported diabetes diagnosis	Diabetes	Yes	No
Salas, et al. (2019)(33)	US	Cross-sectional	78,435	Male and Female	Range:18+					

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
						Household dysfunction (living with anyone who was depressed/mentally ill/suicidal, a problem drinker/alcoholic, a drug user/abuser, or incarcerated, having separated or divorced parents, or living in home where adult abuse was witnessed), physical abuse,	non-gestational	diabetes diagnosis		
								Non		
Kreatsoulas, et al. (2019)(32)	US	Cross-sectional	45,482	Male and Female	Range:18-99	Neglect (depression in home, alcoholic in home, illicit drug use in home, parent/ guardian in prison), violence/ emotional abuse (physical abuse between parents, physical abuse, emotional abuse), sexual abuse (been sexually touched, forced to sexually touch them, sexual intercourse)	Self-reported diabetes diagnosis	Diabetes	Yes	No
						verbal abuse, and sexual abuse (touched sexually, forced to	No	Self-reported		
						touch someone else, or forced to have sex) prior to 18 years of age				
Schoenaker, et al. (2019)(34)	Australia	Cohort	6,317	Female	Baseline: at 18–23 years in 1996, follow up to 2015	Physical abuse, emotional abuse, sexual abuse, household dysfunction (parental substance abuse, parental separation or divorce, mental illness, mother treated violently, criminal behavior)	Self-reported GDM diagnosis	GDM	Yes	Yes

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
White, et al. (2020)(35)	US	Cross-sectional	23,045	Male and Female	Range:40+	Physical abuse, sexual abuse, verbal abuse, parental substance abuse, lived with mentally ill, domestic violence	Self-reported non-gestational diabetes diagnosis	Non-GDM	No	Yes
El Mhamdi, et al. (2020)(36)	Tunisia	Cross-sectional	2,120	Male and Female	Range:18+	Intra-familial early life adversities experienced in the home (conflictual relationship with parents/caregivers, neglect, household dysfunction, physical abuse, sexual abuse), Social early life adversities experienced in the society (peer violence, witnessing community violence, exposure to collective violence)	diagnosis	Diabetes	Yes	No
Ittoop, et al. (2020)(37)	US	Cross-sectional	89	Male and Female	Range:18+	emotional neglect, a parent who's an alcoholic, a mother who's a victim of domestic violence, a family member in jail, a family member diagnosed with a mental illness, and the disappearance of a parent through divorce, death or abandonment	(based on records in medical charts)	Non-GDM	Yes	No
		Self-reported diabetes								
		Any non-gestational diabetes diagnosis								

of Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type ACEs
Stanhope, et al. (2020)(38)	US	Cohort	2,319	Female	Range:18-74	Abuse (physical, sexual, and emotional), neglect (physical and emotional), parental separation, witnessing maternal abuse, living with a substance abuser, mentally ill person in the household, and household member imprisonment	Self-reported GDM diagnosis	GDM	Yes	No
Upadhyaya, et al. (2020)(39)	Finland	Cohort	754	Male	Range:42-60	Parental alcohol problems, parental divorce	Any T2DM diagnosis (based on records in Care Register for Health Care (CRHC))	T2DM	No	Yes
Flores-Torres, et al. (2020)(40)	Mexico	Cohort	9,853	Female	Range:25+ al. (2020)(40)	to parental separation or divorce, physical violence, substance abuse, mental illness, household member incarceration)	and diabetes-related complications	Diabetes	Yes	Yes
Bengtsson, et al. (2020)(41)	Denmark	Cohort	2,153,164	Male and Female	Birth between 1 January 1980 and 31 December 2015	placed in foster care, parental or sibling psychiatric illness, parental alcohol or drug abuse,	Any T1DM diagnosis (based on records in nationwide registers)	T1DM	No	Yes
Family dynamics (i.e., being		Self-reported challenges (household exposure								

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
and parental separation), loss or threat of loss within the family						(i.e., death of a parent or a sibling and parental or sibling somatic illness) and social disadvantage (i.e., family poverty and parental long-term unemployment)				
Wahrer, et al. (2020)(42)	US	Cross-sectional	132,551	Male and Female	Range:18+	Parent divorce, incarceration, substance use, depression, domestic violence, child physical abuse, verbal abuse, sexual abuse	Self-reported diabetes diagnosis	Diabetes	Yes	No
Bala, et al. (2020)(43)	US	Cohort	3,184	Female	Range:14+	Have an adult who can be trusted to help, live with parents or guardians who got divorced or separated, live with incarcerated parents or guardians, live with parents or guardians with substance abuse,	Self-reported diabetes diagnosis	Diabetes	Yes	No

Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
Subramaniam, et al. (2021)(44)	Singapore	Cross-sectional	6,126	Male and Female	Range:18+	Physical abuse, sexual abuse, emotional abuse and neglect by parents or caregivers, family dysfunction move because of problems paying the rent or mortgage, food deprivation, in foster care	Self-reported diabetes diagnosis	Diabetes	Yes	Yes
Almuneef, et al. (2021)(45)	Saudi Arabia	Cross-sectional	10,156	Male and Female	Range:18+	Sexual abuse	Self-reported diabetes diagnosis	Diabetes	No	Yes
Versteegen, et al. (2021)(46)	US	Cohort	300	Female	Range:18-40	Psychological abuse, physical abuse, sexual abuse, violence against mother, or living with household members who were substance abusers, mentally ill or suicidal, or ever imprisoned Physical abuse, emotional neglect, household substance abuse, household mental illness, domestic violence, incarcerated	Any GDM diagnosis (based on medical record) Self-report diagnosis or a physician's diagnosis or in combination with	GDM	Yes	No
Lin, et al. (2021)(47)	China	Cohort	11,972	Male and Female	Range:45+			Diabetes	Yes	No



Authors (year)	Country	Study design	Number of participants	Sex	Age	Exposure	Outcome assessment	Outcome	Number of ACEs	Type of ACEs
Zhang, et al. (2022)(48)	China	Cohort	17,115	Male and Female	Range:45+	household member, parental separation or divorce, unsafe neighborhood and bullying, parental death, sibling death, parental disability  Early maternal death, early paternal death, father: illiteracy, father: farming, hunger, economic hardship, loneliness, neighborhood, poor family relations, abuse from mother, abuse from father, poor self-rated health	health assessment and medication data  Self-report diabetes diagnosis	Diabetes	No	Yes

Notes: ACEs - adverse childhood experiences, T1DM - type 1 diabetes mellitus, T2DM - type 2 diabetes mellitus, GDM - gestational diabetes mellitus, No - not report the number or type of ACEs, Yes - report the number or type of ACEs, US - the United States, UK - the United Kingdom.

**Table S3.** Quality assessment of cross-sectional studies (n=30)

Authors (year)	Define the source of information	List of inclusion and exclusion criteria	Indicate time period	Subjects consecutive	Evaluators of subjective components	Quality assurance	Exclusion from analysis	Confounding control	Missing data	Completeness of data	Completeness of follow-up	Total score
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Goodwin, et

al. (2004)(1)	1	1	1	1	1	0	0	1	0	1	0	7
Ramiro, et al. (2010)(4)	1	0	1	1	1	0	0	1	0	1	0	6
Anda, et al. (2010)(6)	1	0	1	1	0	0	0	1	1	1	0	6
Scott, et al. (2011)(7)	1	1	1	1	1	0	1	1	0	1	0	8
Lynch, et al. (2013)(9)	1	1	1	1	1	1	1	1	0	0	0	8
Ye, et al. (2014)(10)	1	1	1	1	1	0	0	1	0	1	0	7
McCauley, et al. (2015)(11)	1	1	1	1	1	1	1	1	0	1	0	9
Gilbert, et al. (2015)(12)	1	1	1	1	1	0	0	1	0	1	0	7
<b>Authors (year)</b>	<b>Define the source of information</b>	<b>List of inclusion and exclusion criteria</b>	<b>Indicate time period</b>	<b>Subjects consecutive</b>	<b>Evaluators of subjective components</b>	<b>Quality assurance</b>	<b>Exclusion from analysis</b>	<b>Confounding control</b>	<b>Missing data</b>	<b>Completeness of data</b>	<b>Completeness of follow-up</b>	<b>Total score</b>

McCrary, et

al. (2015)(13)	1	1	0	1	1	0	0	1	1	1	0	7
Bellis, et al. (2015)(14)	1	1	1	1	1	0	0	1	0	1	0	7
Friedman, et al. (2015)(15)	1	1	1	1	1	0	1	1	1	1	0	9
Monnat, et al. (2015)(17)	1	1	1	1	0	0	1	1	1	1	0	8
Almuneef, et al. (2016)(18)	1	0	1	1	1	1	0	1	1	0	0	7
Campbell, et al. (2016)(19)	1	1	1	1	1	0	0	1	0	1	0	7
Wade Jr, et al. (2016)(20)	1	1	1	1	1	0	0	1	0	1	0	7
Ford, et al. (2016)(22)	1	1	1	1	1	0	1	1	0	1	0	8
<b>8 Define the List of inclusion Evaluators Exclusion</b> <b>Authors source of and exclusion Indicate time Subjects of subjective Quality from Confounding Missing Completeness Completeness Total (year) information criteria period consecutive components</b> <b>assurance analysis control data of data of follow-up score</b>												
Shields, et al. (2016)(23)	1	1	1	1	0	0	1	1	1	1	0	8

Wade, et al. (2017)(24)	1	0	1	1	1	0	0	1	1	1	0	7
Chanlongbutr a, et al. (2018)(26)	1	1	1	1	1	0	0	1	0	0	0	6
Amemiya, et al. (2019)(28)	1	1	1	1	1	0	1	1	1	1	0	9
Carrillo-Vega, et al. (2019)(29)	1	1	1	1	1	0	1	1	1	1	0	9
Merrick, et al. (2019)(31)	1	1	1	1	1	0	1	1	0	1	0	8
Kreatsoulas, et al. (2019)(32)	1	1	1	1	1	0	1	1	1	0	0	8
<b>Authors (year)</b>	<b>Define the source of information</b>	<b>List of inclusion and exclusion criteria</b>	<b>Indicate time period</b>	<b>Subjects consecutive</b>	<b>Evaluators of subjective components</b>	<b>Quality assurance</b>	<b>Exclusion from analysis</b>	<b>Confounding control</b>	<b>Missing data</b>	<b>Completeness of data</b>	<b>Completeness of follow-up</b>	<b>Total score</b>

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Salas, et al. (2019)(33)	1	1	1	1	1	0	0	1	1	1	0	8
White, et al. (2020)(35)	1	1	1	1	1	0	1	1	1	1	0	9
El Mhamdi, et al. (2020)(36)	1	1	1	1	1	0	0	1	0	0	0	6
Ittoop, et al. (2020)(37)	1	1	1	1	1	1	0	1	1	0	0	8
Wachrer, et al. (2020)(42)	1	1	1	1	1	0	0	1	1	0	0	7
Subramaniam, et al. (2021)(44)	1	1	1	1	1	0	0	1	0	1	0	7
Almuneef, et al. (2021)(45)	1	1	1	1	1	0	1	1	1	1	0	9

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**Table**

**S4. Quality assessment of cohort studies (n=19)**

Authors (year)	Selection				Comparability of cohorts		Outcome			Total scores
	Representativeness of	Selection of the		Ascertainment	Outcome of	Comparability	Assessment of	Follow-up	Adequacy of	
		cohort	nonexposed cohort	the exposed cohort	of exposure	of exposure	interest	outcome	follow up of cohorts	
Thomas, et al. (2008)(2)	1	1		0	1	2	0	1	1	7
Alastalo, et al. (2009)(3)	1	1		0	1	2	1	1	1	8
Rich-Edwards, et al. (2010)(5)	0	1	0	1	2	0	1	1	6	
Widom, et al. (2012)(8)	1	1	0	1	2	1	1	0	7	
Duncan, et al. (2015)(16)	1	1		0	1	2	1	1	1	8
Mason, et al. (2016)(21)	0	1	0	1	2	1	1	0	6	
Llabre, et al. (2017)(25)	1	1	0	1	2	0	1	1	7	
Lown, et al. (2019)(27)	1	1		0	1	2	0	1	1	7
Amemiya, et al. (2019)(28)	0	1	0	1	2	1	1	1	7	

Felitti, et al. (2019)(30)	1	1	0	1	2	0	1	1	7		
Schoenaker, et al.	1	1		0	1		2	0	1	1	7
	<b>Selection</b>					<b>Comparability of cohorts</b>		<b>Outcome</b>			
<b>Authors (year)</b>	<b>Representativeness of the exposed cohort</b>	<b>Selection of the nonexposed cohort</b>	<b>Ascertainment of exposure</b>	<b>Outcome of interest</b>	<b>Comparability</b>	<b>Assessment of outcome</b>	<b>Follow-up duration</b>	<b>Adequacy of follow up of cohorts</b>	<b>Total scores</b>		
al. (2019)(34)											
Stanhope, et al. (2020)(38)	1	1	0	1	2	0	1	1	7		
Upadhyaya, et al. (2020)(39)	1	1	0	1	2	1	1	1	8		
Flores-Torres, et al. (2020)(40)	0	1	0	1	2	0	1	1	6		
Bengtsson, et al. (2020)(41)	1	1	0	1	2	1	1	1	8		
Bala, et al. (2020)(43)	1	1	0	1	2	1	1	0	7		
Versteegen, et al. (2021)(46)	1	1	0	1	2	1	1	1	8		
Lin, et al. (2021)(47)	1	1	0	1	2	1	1	1	8		
Zhang, et al. (2022)(48)	1	1	0	1	2	1	1	0	7		

**Table**

**S5. Subgroup meta-analysis for number of ACEs and risk of diabetes**

	Continuous ACEs		Any ACE vs 0 ACEs		1 ACE vs 0 ACEs		2 ACEs vs 0 ACEs		3 ACEs vs 0 ACEs		4+ACEs vs 0 ACEs		4+ ACEs vs <4 ACEs	
	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)
<b>Type of DB</b>														
Diabetes	5	<b>1.07 (1.02, 1.12)</b>	20	<b>1.20 (1.13, 1.26)</b>	17	<b>1.08 (1.04, 1.12)</b>	14	<b>1.23 (1.12, 1.35)</b>	12	<b>1.32 (1.17, 1.48)</b>	11	<b>1.36 (1.17, 1.58)</b>	1	<b>1.20 (1.06, 1.36)</b>
Non-GDM	1	1.23 (0.89, 1.72)	2	<b>1.29 (1.18, 1.41)</b>	1	1.30 (0.99, 1.70)	1	1.31 (0.94, 1.82)	1	1.47 (0.98, 2.20)	2	<b>1.40 (1.20, 1.65)</b>	-	-
T2DM	1	<b>1.11 (1.01, 1.22)</b>	3	<b>1.33 (1.19, 1.49)</b>	3	1.10 (0.93, 1.31)	1	<b>1.31 (1.02, 1.69)</b>	1	1.27 (0.89, 1.82)	3	<b>2.03 (1.20, 3.44)</b>	-	-
GDM	2	0.97 (0.90, 1.04)	1	1.12 (0.95, 1.32)	-	-	-	-	1	1.29 (0.92, 1.81)	1	1.49 (1.00, 2.22)	2	0.88 (0.58, 1.32)
<b>Study design</b>														
Cohort	4	1.02 (0.93, 1.12)	7	<b>1.17 (1.10, 1.25)</b>	3	1.05 (0.92, 1.20)	3	1.16 (0.98, 1.37)	5	<b>1.21 (1.04, 1.41)</b>	5	<b>1.47 (1.18, 1.82)</b>	2	0.88 (0.58, 1.32)
Cross-sectional	5	<b>1.08 (1.06, 1.10)</b>	19	<b>1.23 (1.16, 1.31)</b>	18	<b>1.08 (1.04, 1.13)</b>	13	<b>1.26 (1.15, 1.39)</b>	10	<b>1.39 (1.24, 1.55)</b>	12	<b>1.42 (1.22, 1.66)</b>	1	<b>1.20 (1.06, 1.36)</b>
<b>WHO region</b>														
AMR	7	1.04 (1.00, 1.09)	14	<b>1.19 (1.15, 1.24)</b>	12	<b>1.08 (1.04, 1.12)</b>	10	<b>1.21 (1.12, 1.31)</b>	10	<b>1.36 (1.25, 1.47)</b>	11	<b>1.34 (1.23, 1.47)</b>	3	1.10 (0.85, 1.42)
WPR	1	1.08 (1.00, 1.17)	5	<b>1.11 (1.04, 1.18)</b>	3	1.04 (0.88, 1.23)	3	1.15 (0.97, 1.37)	3	1.08 (0.90, 1.29)	3	<b>1.24 (1.03, 1.48)</b>	-	-
EMR	-	-	2	<b>1.66 (1.41, 1.94)</b>	2	<b>1.28 (1.08, 1.51)</b>	2	<b>1.65 (1.39, 1.95)</b>	2	<b>1.72 (1.40, 2.10)</b>	1	<b>2.38 (2.00, 2.83)</b>	-	-
EUR	1	<b>1.17 (1.06, 1.29)</b>	4	<b>1.22 (1.05, 1.42)</b>	3	1.02 (0.85, 1.21)	-	-	-	-	2	1.87 (0.72, 4.83)	-	-
<b>Adjustment for model</b>														
<b>Sex</b>														
Yes	5	<b>1.08 (1.02, 1.15)</b>	21	<b>1.22 (1.16, 1.29)</b>	19	<b>1.08 (1.04, 1.12)</b>	14	<b>1.26 (1.17, 1.36)</b>	11	<b>1.32 (1.16, 1.50)</b>	13	<b>1.46 (1.28, 1.67)</b>	1	<b>1.20 (1.06, 1.36)</b>
No	1	1.23 (0.89, 1.72)	1	0.90 (0.69, 1.18)	1	1.00 (0.76, 1.32)	1	0.70 (0.44, 1.11)	1	1.10 (0.63, 1.90)	1	0.74 (0.49, 1.12)	-	-
<b>Age</b>														
Yes	6	<b>1.07 (1.03, 1.12)</b>	25	<b>1.22 (1.16, 1.28)</b>	21	<b>1.08 (1.04, 1.12)</b>	16	<b>1.24 (1.14, 1.35)</b>	14	<b>1.33 (1.20, 1.47)</b>	16	<b>1.44 (1.26, 1.64)</b>	1	<b>1.20 (1.06, 1.36)</b>
No	3	0.98 (0.91, 1.07)	1	1.12 (0.95, 1.32)	-	-	-	-	1	1.29 (0.92, 1.81)	1	1.49 (1.00, 2.22)	2	0.88 (0.58, 1.32)
<b>Race</b>														
Yes	5	1.04 (0.99, 1.10)	16	<b>1.19 (1.15, 1.24)</b>	15	<b>1.08 (1.04, 1.12)</b>	11	<b>1.22 (1.15, 1.30)</b>	9	<b>1.27 (1.13, 1.42)</b>	12	<b>1.39 (1.26, 1.53)</b>	2	1.04 (0.71, 1.52)



	No ACE vs 0 ACEs		1.11 (1.04, 1.18) 10 2 ACEs vs 0 ACEs		1.21 (1.06, 1.39) 6 3 ACEs vs 0 ACEs		1.12 (1.01, 1.25) 5 4+ACEs vs 0 ACEs		1.19 (0.86, 1.65) 6 4+ ACEs vs <4 ACEs		1.50 (1.28, 1.75) 5		1.43 (0.93, 2.18) 1		1.31 (0.50, 3.41) Continuous ACEs		Any ACE vs 0 ACEs		1		
	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	Studies	OR (95% CI)	
<b>Education</b>																					
Yes	6	1.05 (1.00, 1.11)	17	1.22 (1.14, 1.29)	15	1.10 (1.05, 1.14)	13	1.26 (1.16, 1.36)	11	1.30 (1.16, 1.46)	11	1.47 (1.25, 1.71)	2	1.04 (0.71, 1.52)							
No	3	1.09 (1.01, 1.18)	9	1.21 (1.11, 1.31)	6	1.02 (0.94, 1.11)	3	1.12 (0.74, 1.69)	4	1.43 (1.18, 1.74)	6	1.39 (1.07, 1.81)	1	1.31 (0.50, 3.41)							
<b>Employment</b>																					
Yes	2	1.12 (1.04, 1.21)	6	1.19 (1.12, 1.26)	5	1.12 (1.04, 1.20)	4	1.28 (1.10, 1.49)	3	1.14 (0.81, 1.60)	4	1.40 (1.13, 1.75)	1	1.20 (1.06, 1.36)							
No	7	1.04 (0.99, 1.09)	20	1.22 (1.15, 1.30)	16	1.07 (1.02, 1.11)	12	1.23 (1.10, 1.36)	12	1.36 (1.23, 1.50)	13	1.45 (1.24, 1.70)	2	0.88 (0.58, 1.32)							
<b>Economic status</b>																					
Yes	2	1.02 (0.95, 1.10)	12	1.22 (1.15, 1.30)	11	1.13 (1.05, 1.21)	9	1.26 (1.15, 1.37)	7	1.21 (1.02, 1.43)	9	1.45 (1.24, 1.69)	-	-							
No	7	1.08 (1.02, 1.13)	14	1.21 (1.13, 1.30)	10	1.06 (1.02, 1.11)	7	1.20 (1.00, 1.44)	8	1.42 (1.30, 1.56)	8	1.41 (1.15, 1.73)	3	1.10 (0.85, 1.42)							
<b>Marital status</b>																					
Yes	3	1.09 (1.03, 1.15)	11	1.22 (1.12, 1.34)	10	1.12 (1.06, 1.18)	8	1.32 (1.20, 1.45)	6	1.26 (1.04, 1.53)	7	1.47 (1.18, 1.83)	1	1.20 (1.06, 1.36)							
No	6	1.04 (0.97, 1.11)	15	1.19 (1.14, 1.25)	11	1.05 (1.00, 1.10)	8	1.14 (0.99, 1.31)	9	1.37 (1.25, 1.51)	10	1.41 (1.21, 1.64)	2	0.88 (0.58, 1.32)							
<b>BMI</b>																					
Yes	3	0.99 (0.94, 1.03)	2	1.17 (0.96, 1.42)	1	1.10 (0.69, 1.76)	1	1.30 (0.77, 2.20)	-	-	-	-	1	1.31 (0.50, 3.41)							
No	6	1.08 (1.03, 1.12)	24	1.22 (1.16, 1.28)	20	1.08 (1.04, 1.12)	15	1.24 (1.14, 1.35)	15	1.33 (1.20, 1.46)	17	1.44 (1.27, 1.63)	2	1.04 (0.71, 1.52)							

Notes: ACEs - adverse childhood experiences, OR - odds ratio, CI - confidence interval, T1DM - type 1 diabetes mellitus, T2DM - type 2 diabetes mellitus, GDM gestational diabetes mellitus, Non-GDM - diabetes excluding gestational diabetes mellitus, WHO region - the World Health Organization region, AMR - countries in the WHO Region of the Americas, EMR - countries in the WHO Eastern Mediterranean Region, EUR - countries in the WHO European Region, WPR - countries in the WHO Western Pacific Region, BMI- body mass index. If data from more than one country were included in a study, they were excluded in the subgroup analysis according to the WHO region. If the adjustment for confounders was not explicitly shown in the model, this study was excluded from the subgroup analysis.

**Table**

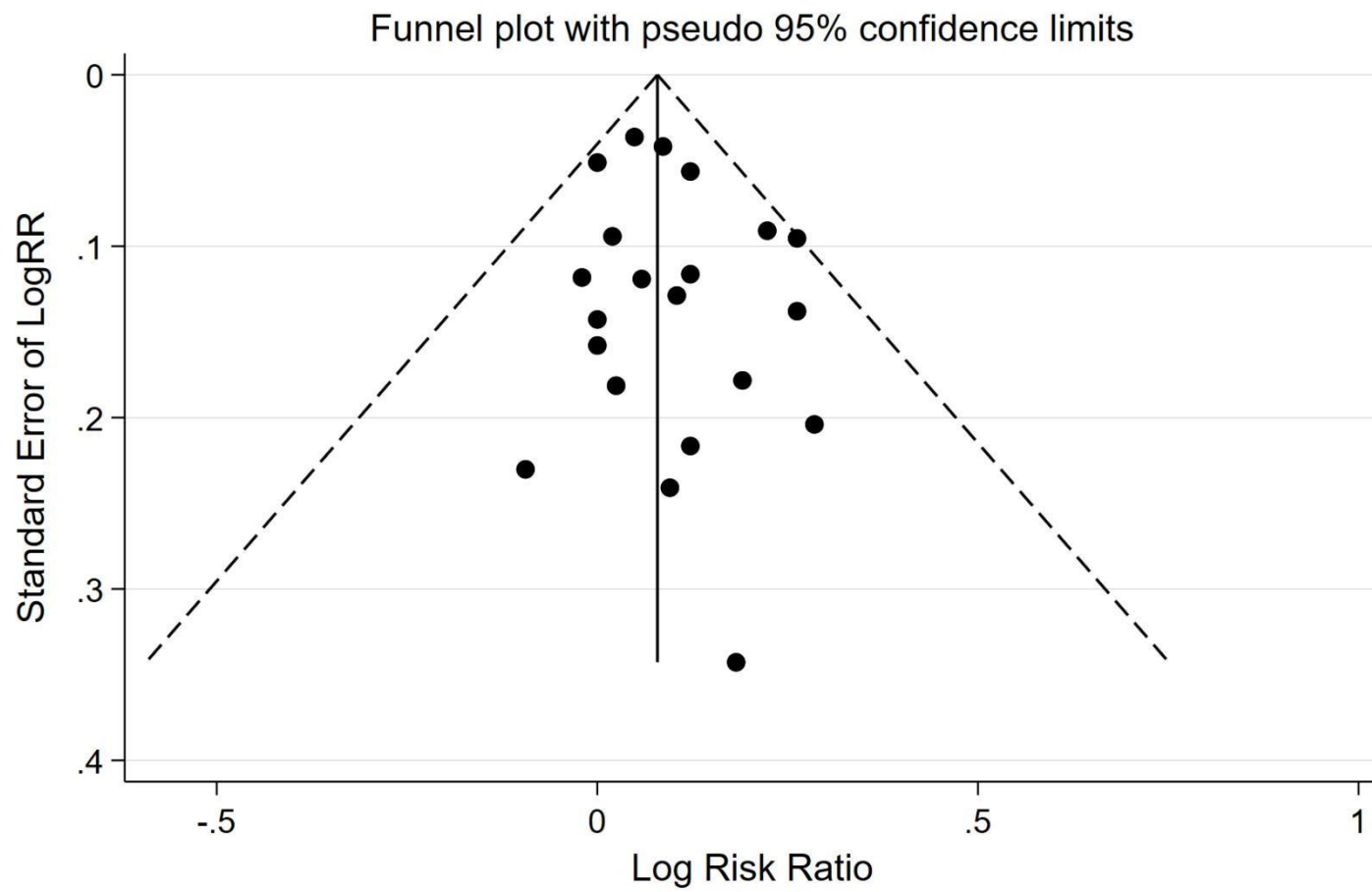
**S6. Sensitivity meta-analysis for the number of ACEs and risk of diabetes**

	Continuous ACEs		Any ACEs vs 0 ACEs		1 ACE vs 0 ACEs		2 ACEs vs 0 ACEs		3 ACEs vs 0 ACEs		4+ACEs vs 0 ACEs	
	Studies	OR (95%CI)	Studies	OR (95%CI)	Studies	OR (95%CI)	Studies	OR (95%CI)	Studies	OR (95%CI)	Studies	OR (95%CI)
Excluded 1 study at a time												
Combined	9	<b>1.06(1.01,1.10)</b>	26	<b>1.08(1.04,1.12)</b>	21	<b>1.07(1.03,1.11)</b>	16	<b>1.20(1.09,1.31)</b>	15	<b>1.28(1.14,1.42)</b>	17	<b>1.38(1.23,1.54)</b>
1	8	1.06(1.00,1.12)	25	<b>1.08(1.04,1.11)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.19(1.07,1.30)</b>	14	<b>1.28(1.13,1.43)</b>	16	<b>1.36(1.21,1.51)</b>
2	8	1.05(1.00,1.10)	25	<b>1.08(1.04,1.12)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.21(1.10,1.32)</b>	14	<b>1.29(1.15,1.43)</b>	16	<b>1.38(1.23,1.54)</b>
3	8	1.05(1.00,1.09)	25	<b>1.08(1.04,1.12)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.17(1.07,1.26)</b>	14	<b>1.25(1.11,1.38)</b>	16	<b>1.30(1.18,1.42)</b>
4	8	<b>1.05(1.01,1.10)</b>	25	<b>1.08(1.04,1.11)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.18(1.06,1.30)</b>	14	<b>1.26(1.11,1.42)</b>	16	<b>1.40(1.23,1.57)</b>
5	8	<b>1.07(1.03,1.11)</b>	25	<b>1.08(1.04,1.12)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.19(1.08,1.31)</b>	14	<b>1.27(1.13,1.41)</b>	16	<b>1.38(1.22,1.55)</b>
6	8	1.05(1.00,1.10)	25	<b>1.08(1.04,1.11)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.20(1.08,1.31)</b>	14	<b>1.27(1.12,1.42)</b>	16	<b>1.38(1.22,1.55)</b>
7	8	<b>1.06(1.01,1.11)</b>	25	<b>1.08(1.04,1.11)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.18(1.07,1.30)</b>	14	<b>1.29(1.14,1.43)</b>	16	<b>1.42(1.28,1.56)</b>
8	8	1.05(1.00,1.10)	25	<b>1.08(1.04,1.11)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.18(1.07,1.30)</b>	14	<b>1.32(1.21,1.44)</b>	16	<b>1.40(1.24,1.56)</b>
9	8	<b>1.07(1.03,1.11)</b>	25	<b>1.08(1.04,1.11)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.24(1.15,1.32)</b>	14	<b>1.28(1.14,1.43)</b>	16	<b>1.36(1.21,1.51)</b>
10			25	<b>1.08(1.04,1.12)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.20(1.08,1.31)</b>	14	<b>1.27(1.11,1.42)</b>	16	<b>1.38(1.22,1.53)</b>
11			25	<b>1.08(1.04,1.12)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.20(1.08,1.31)</b>	14	<b>1.28(1.14,1.43)</b>	16	<b>1.39(1.21,1.56)</b>
12			25	<b>1.08(1.04,1.11)</b>	20	<b>1.08(1.04,1.12)</b>	15	<b>1.22(1.10,1.33)</b>	14	<b>1.27(1.12,1.41)</b>	16	<b>1.38(1.22,1.55)</b>
13			25	<b>1.08(1.04,1.12)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.19(1.06,1.33)</b>	14	<b>1.28(1.13,1.43)</b>	16	<b>1.38(1.22,1.54)</b>
14			25	<b>1.11(1.06,1.16)</b>	20	<b>1.07(1.03,1.11)</b>	15	<b>1.20(1.09,1.32)</b>	14	<b>1.27(1.13,1.42)</b>	16	<b>1.40(1.22,1.58)</b>
15			25	<b>1.08(1.04,1.12)</b>	20	<b>1.09(1.04,1.13)</b>	15	<b>1.19(1.07,1.31)</b>	14	<b>1.32(1.19,1.46)</b>	16	<b>1.39(1.23,1.55)</b>
16			25	<b>1.08(1.04,1.12)</b>	20	<b>1.08(1.04,1.13)</b>	15	<b>1.20(1.08,1.32)</b>			16	<b>1.38(1.22,1.54)</b>
17			25	<b>1.08(1.04,1.12)</b>	20	<b>1.07(1.03,1.11)</b>					16	<b>1.41(1.24,1.57)</b>
18			25	<b>1.08(1.04,1.11)</b>	20	<b>1.07(1.03,1.11)</b>						

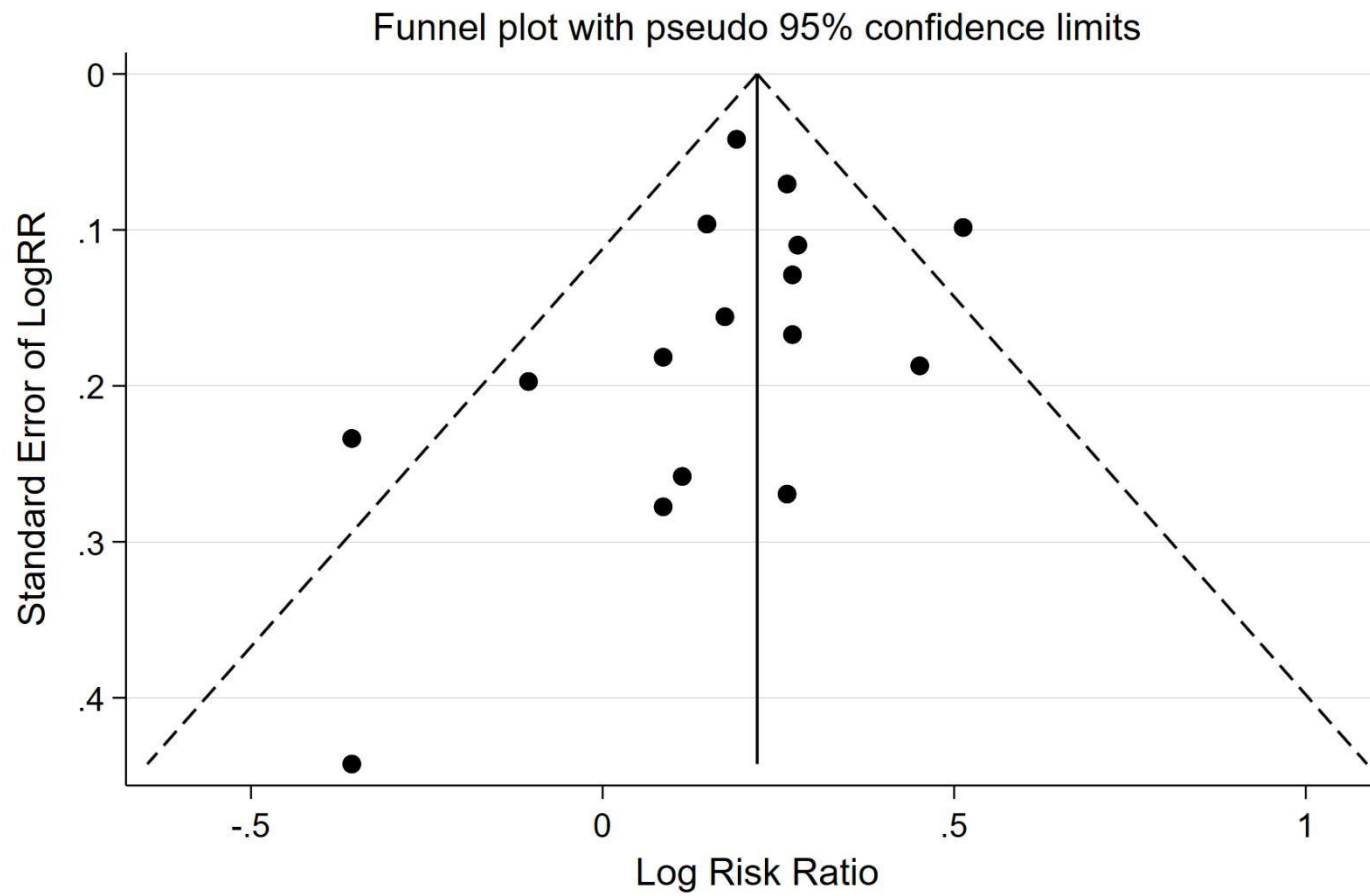
19	25	<b>1.08(1.04,1.11)</b>	20	<b>1.07(1.03,1.11)</b>
20	25	<b>1.08(1.04,1.11)</b>	20	<b>1.07(1.03,1.11)</b>
21	25	<b>1.08(1.04,1.12)</b>	20	<b>1.08(1.04,1.12)</b>
22	25	<b>1.08(1.04,1.11)</b>		

	Continuous ACEs		Any ACEs vs 0 ACEs		1 ACE vs 0 ACEs		2 ACEs vs 0 ACEs		3 ACEs vs 0 ACEs		4+ACEs vs 0 ACEs	
	Studies	OR (95%CI)	Studies	OR (95%CI)	Studies	OR (95%CI)	Studies	OR (95%CI)	Studies	OR (95%CI)	Studies	OR (95%CI)
<b>Excluded 1 study at a time</b>			25	<b>1.08(1.04,1.11)</b>								
23												
24			25	<b>1.08(1.04,1.11)</b>								
25			25	<b>1.08(1.04,1.12)</b>								
26			25	<b>1.08(1.04,1.12)</b>								

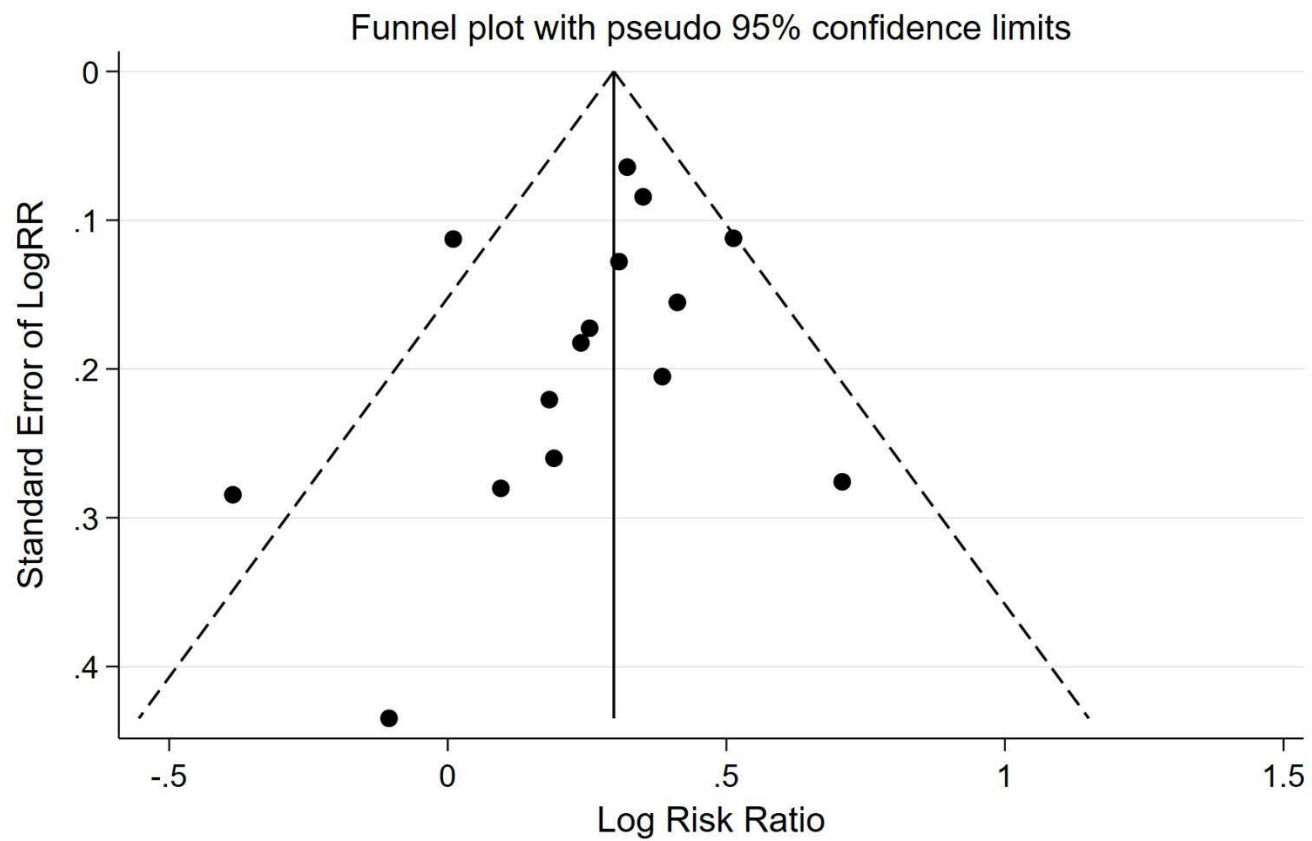
Notes: ACEs - adverse childhood experiences, OR - odds ratio, CI - confidence interval.



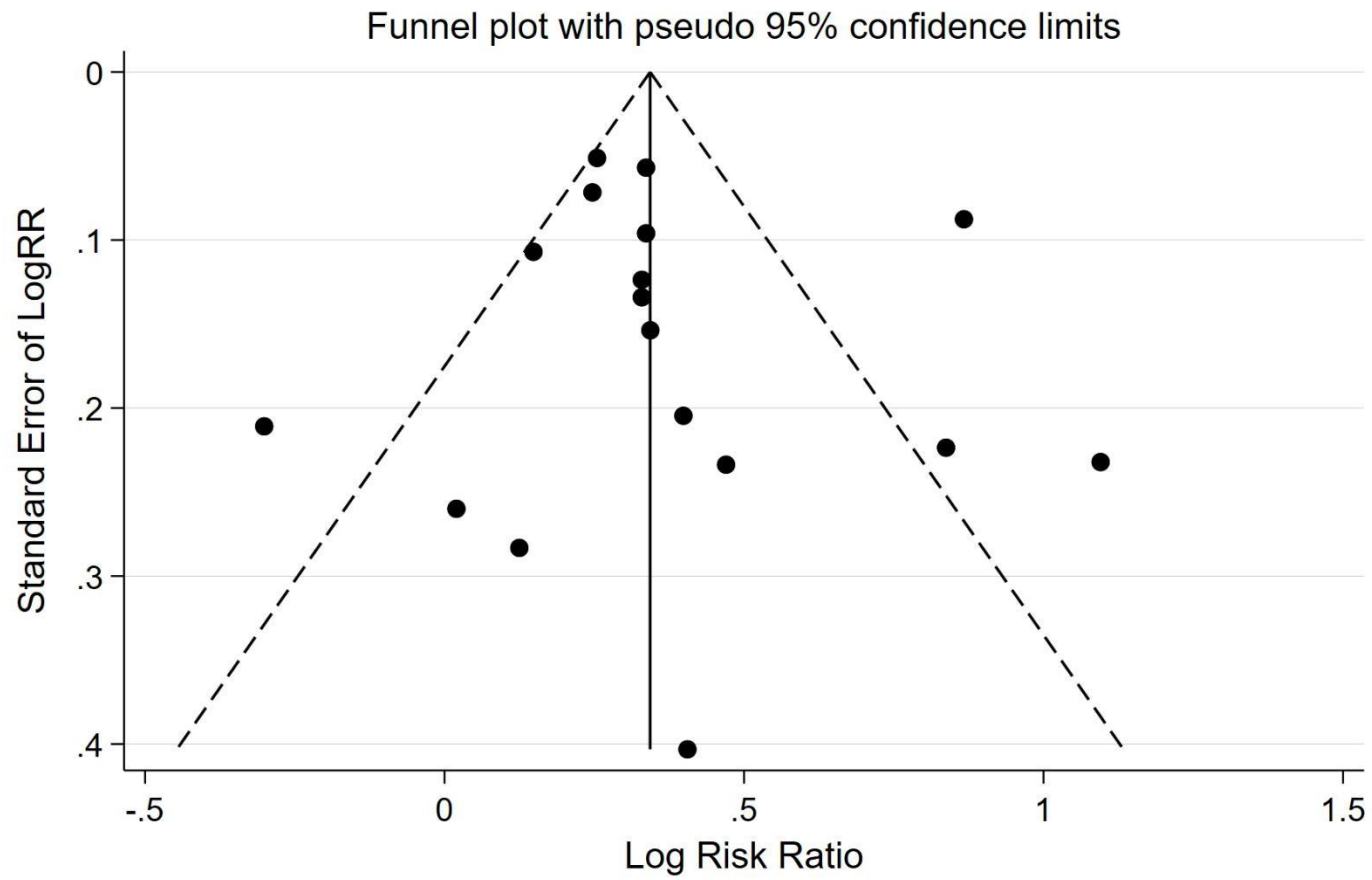
**Figure S1.** Funnel plot to detect publication bias for 1 ACE vs 0 ACEs and risk of diabetes, Egger test,  $P=0.293$



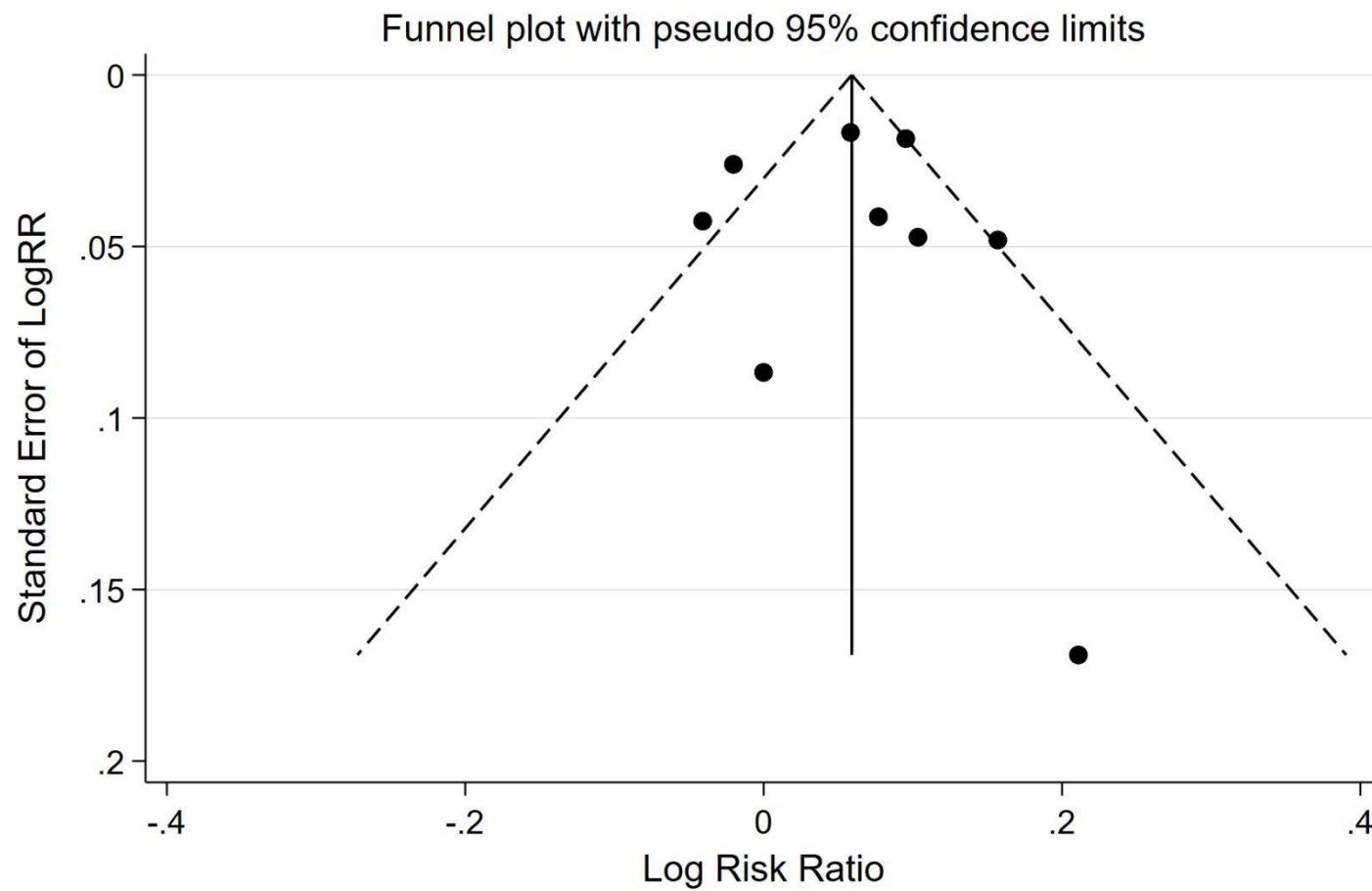
**Figure S2.** Funnel plot to detect publication bias for 2 ACEs vs 0 ACEs and risk of diabetes, Egger test,  $P=0.378$



**Figure S3.** Funnel plot to detect publication bias for 3 ACEs vs 0 ACEs and risk of diabetes, Egger test, P=0.289

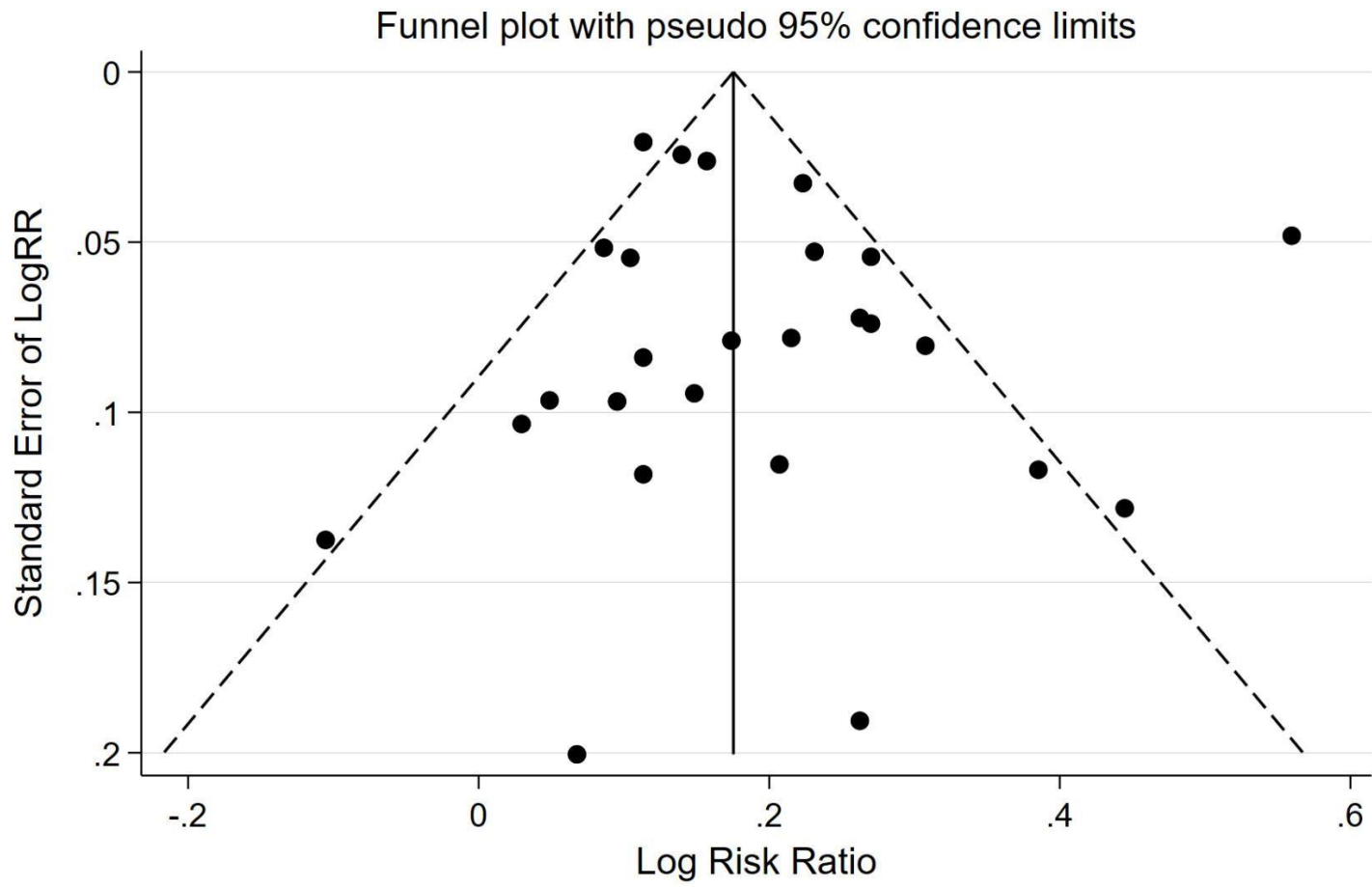


**Figure S4.** Funnel plot to detect publication bias for 4+ ACEs vs 0 ACEs and risk of diabetes, Egger test,  $P=0.669$

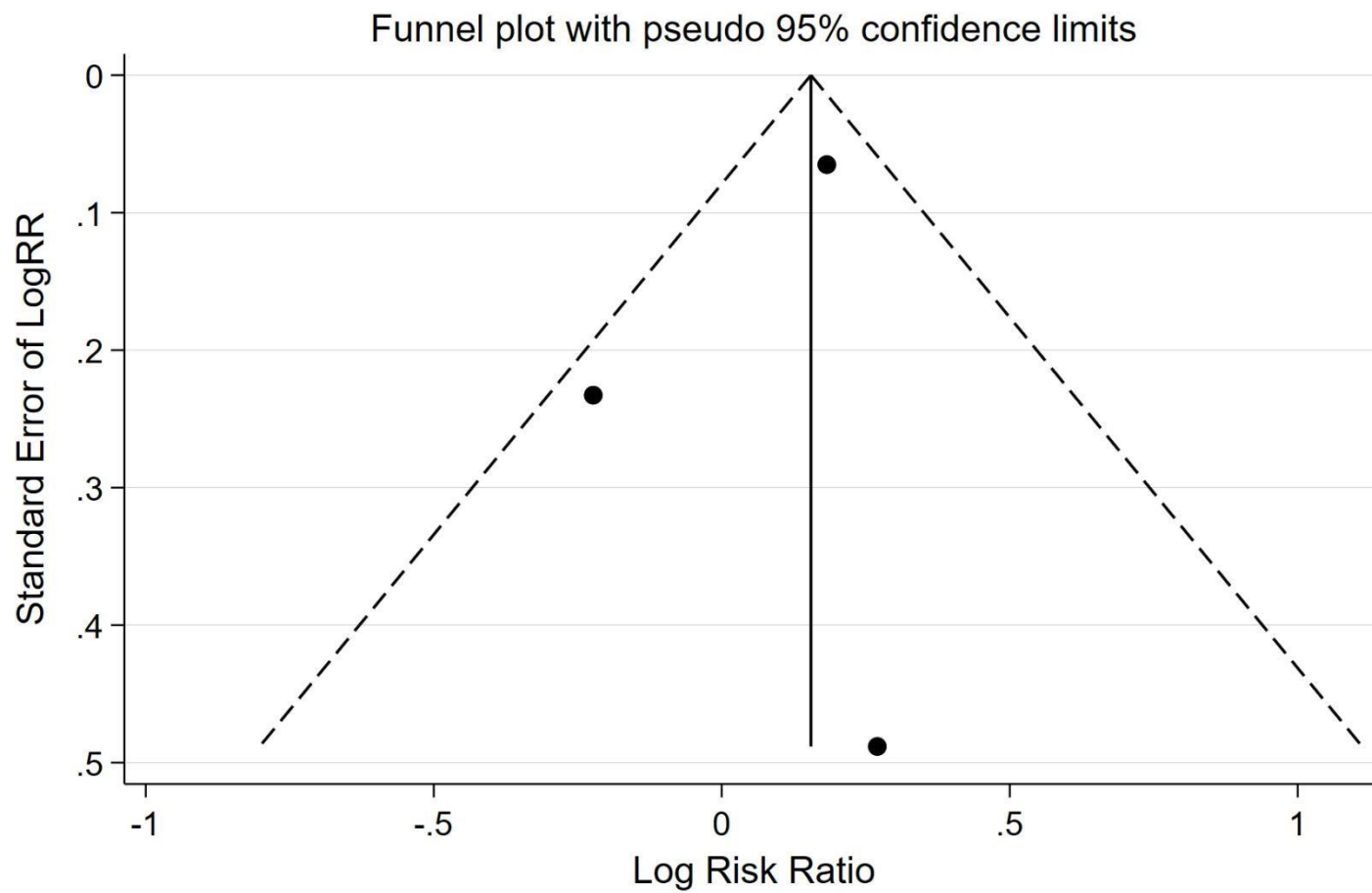


**Figure S5.** Funnel plot to detect publication bias for continuous ACEs and risk of diabetes





**Figure S6.** Funnel plot to detect publication bias for any ACE vs 0 ACEs and risk of diabetes, Egger test,  $P=0.362$



**Figure S7.** Funnel plot to detect publication bias for 4+ ACEs vs <4 ACEs and risk of diabetes

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