SUPPLEMENTARY DATA

Search strategy for the major database used: PUBMED

# 1	"diabetes" [MeSh]
# 2	"diabetes" [Title/Abstract]
# 3	"hypoglycemia" [MeSh]
# 4	"hypoglycemia" [Title/Abstract]
# 5	"hyperglycemia" [MeSh]
# 6	"hyperglycemia" [Title/Abstract]
# 7	"glycosylated hemoglobin" [MeSh]
# 8	"glycosylated hemoglobin" [Title/Abstract]
# 9	# 1 OR # 2 OR # 3 OR # 4 OR # 5 OR # 6 OR # 7 OR #8
# 10	"efficiency"[Mesh]
# 11	"efficiency"[Title/Abstract]
# 12	"lost productivity" [Title/Abstract]
# 13	"loss productivity" [Title/Abstract]
# 14	"work productivity" [Title/Abstract]
# 15	"lost productive time" [Title/Abstract]
# 16	"lost time" [Title/Abstract]
# 17	"work lost" [Title/Abstract]
# 18	"work loss" [Title/Abstract]
# 19	"employment"[Mesh]
# 20	"employment"[Title/Abstract]
# 21	"work performance" [Title/Abstract]
# 22	"work limitation" [Title/Abstract]
# 23	"presenteeism" [Title/Abstract]
# 24	"absenteeism"[Mesh]
# 25	"absenteeism"[Title/Abstract]
# 26	"disabled persons"[Mesh]
# 27	"disabled persons"[Title/Abstract]
# 28	"sick leave"[Mesh]
# 29	"sick leave"[TIAB]
# 30	"retirement"[Mesh]
# 31	"retirement"[TIAB]
# 32	# 10 OR #11 OR #12 OR #13 OR #14 OR #15 OR # 16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR 24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31
# 33	#9 AND #32
# 24	Limits: Humans, All Adult: 19+ years, Adolescent: 13-18 years

SUPPLEMENTARY DATA

Supplementary Table 1. Summary of characteristics of included studies on the impact of type 2 diabetes on ability to work

Authors	Country	Period of data collection	Population	Age	Type of diabetes	Diabetes assessment
						Data collection instrument
Cohort						
daCosta Dibonaventura et al., 2011(16)	United States	2006 to 2008	General population	≥18	1 and 2	Questionnaire
Herquelot et al., 2011 (7)	France	1989 to 2007	Employees	35-60	1 and 2	Questionnaire
De Backer et al., 2006 (18)	Belgium	1994 to 1998	Employees	35-59	1 and 2[†]	Questionnaire
Tunceli et al., 2005 (22)	United States	1992, 1994	General population	51-61	1 and 2	Questionnaire[‡]
Vijan et al., 2004 (5)	United States	1994, 1996, 1998, 2000	General population	51-61	1 and 2	Questionnaire[‡]
Case-control						
Robinson et al., 1990 (35)	United Kingdom	1985 to 1987	Patients of diabetes clinics/friends of diabetes patients	17-65	1 and 2	List of diabetes patients
Cross-sectional						
Holden et al., 2011 (20)	Australia	2004 to 2005	Employees	18-70	1 and 2[†]	WHO-HPQ
Lenneman et al., 2011 (33)	United States	2005 to 2009	General population	≥18	1 and 2	HealthMedia Succeed HRA questionnaire
Fu et al., 2009 (19)	United States	2004, 2006	General population	≥18	1 and 2	MEPS databases
Vamos et al., 2009 (21)	Hungary	2002	General population	>18	1 and 2	Questionnaire
Alavinia et al., 2008 (4)	European countries*	2004	General population	50-64	1 and 2[†]	CAPI[‡]
Cawley et al., 2008 (17)	United States	2000 to 2004	General population	18-64	1 and 2	MEPS database
Kannan et al., 2008 (30)	United States	2006	General population[§]	18-92	2	Questionnaire
Stewart et al., 2007 (34)	United States	2001 to 2004	General population	40-65	1 and 2	CAPI

SUPPLEMENTARY DATA

Authors	Country	Period of data collection	Population	Age	Type of diabetes	Data collection instrument
Collins et al., 2005 (29)	United States	2002	Employees	All age	1 and 2	SPS, ICD-9 codes and drugs
Boles et al., 2004 (14)	United States	2001	Employees	All age	1 and 2	HRA questionnaire
Burton et al., 2004 (28)	United States	2002	Employees	18-64	1 and 2	HRA questionnaire
Vijan et al., 2004 (5)	United States	1992	General population	51-61	1 and 2	Questionnaire[‡]
Lavigne et al., 2003 (32)	United Stated	1999	Employees	≤64	2	Claim data and medical chart
Yassin et al., 2002 (6)	United States	1994	General population	18-64	1 and 2	Questionnaire
Kessler et al., 2001 (31)	United States	1995 to 1996	General population	25-54	1 and 2	Questionnaire
Ng et al., 2001 (10)	United States	1989	General population	18-65	2	Questionnaire[‡]
Burton et al., 1999 (15)	United States	1994 to 1995	Employees	All age	1 and 2	Health Risk Appraisal questionnaire
Mayfield et al., 1999 (12)	United States	1987	General population	≥25	1 and 2	Questionnaire[‡]

CAPI: Computer Assisted Personal Interviewing; HRA: Health Risk Assessment; ICD-9: International Classification of Diseases, Ninth Revision; MEPS: Medical Expenditure Panel Survey; SPS: Stanford Presenteeism Scale ; WHO-HPQ: World Health Organization Health and Productivity Questionnaire

*Sweden, Denmark, the Netherlands, Germany, Austria, Switzerland, France, Italy, Spain, Greece

[†]Information obtained from the author

[‡]Information obtained from the official survey website

[§]Overweight or obese individuals

SUPPLEMENTARY DATA

Supplementary Table 2. Quality of studies included in the review based on the modified Newcastle-Ottawa Scale for assessing cross-sectional studies

	Alavinia et al., 2008 (4)	Boles et al., 2004 (14)	Burton et al., 2004 (28)	Burton et al., 1999 (15)	Cawley et al., 2008 (17)	Collins et al., 2005 (29)	Fu et al., 2009 (19)	Holden et al., 2011 (20)	Kannan et al., 2008 (30)	Kessler et al.,2001 (31)	Lavigne et al.,2003 (32)	Lenneman et al., 2011 (33)	Mayfield et al., 1999 (12)	Ng et al., 2001 (10)	Stewart et al., 2007 (34)	Vamos et al., 2009 (21)	Vijan et al., 2004 (5)	Yassin et al., 2002 (6)
Quality criteria's																		
Selection																		
Representativeness of the study group	*				*		*					*	*	*	*	*		*
Selection of the comparison group	*	*	*	*	*	*	*	*	*	*			*	*	*	*	*	*
Ascertainment of exposure	*				*		*				*		*	*	*	*	*	*
Comparability																		
Controls for age or other factors *	*	*	*		*	*	**	*	*	*	*		*	*	*	**	*	*
Outcome																		
Ascertainment of outcome																		
Total stars †	4	2	2	1	4	2	5	2	2	2	2	1	4	4	4	5	3	4

* Others factors included: demographic factors (gender, level of education), lifestyle factors (tobacco) and presence of co-morbidity
† A study can be awarded a maximum of one star for each numbered item within the selection and outcome sections. A maximum of two stars can be given for comparability (one star for controlling for age and one star for controlling for any other factors). A maximum of 6 stars is allowed for each study.
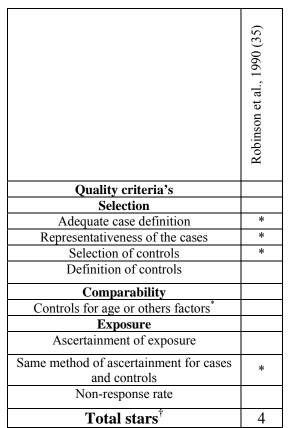
SUPPLEMENTARY DATA

Supplementary Table 3. Quality of studies included in the review based on the Newcastle-Ottawa Scale for assessing cohort studies

	daCosta Dibonaventura et al., 2011 (16)	De Backer et al., 2006 (18)	Herquelot et al., 2011 (7)	Tunceli et al., 2005 (22)	Vijan et al.,2004 (5)
Quality criteria's					
Selection					
Representativeness of the exposed cohort	*				
Selection of the non- exposed cohort	*	*	*	*	*
Ascertainment of exposure				*	*
Comparability					
Controls for age or other factors [*]	*	*	*	*	*
Outcome					
Ascertainment of outcome		*	*		
Follow-up long enough for outcome to occur	*	*	*	*	*
Adequacy of follow up of cohorts		*	*	*	
Total stars [†]	4	5	5	5	4

[*]Others factors included: demographic factors (gender, level of education), lifestyle factors (tobacco) and presence of co-morbidity

[†]A study can be awarded a maximum of one star for each numbered item within the selection and outcome sections. A maximum of two stars can be given for comparability (one star for controlling for age and one star for controlling for any other factors). A maximum of 8 stars is allowed for each study.

SUPPLEMENTARY DATA

Supplementary Table 4. Quality of studies included in the review based on the modified Newcastle-Ottawa Scale for assessing case-control studies

	Robinson et al., 1990 (35)
Quality criteria's	
Selection	
Adequate case definition	*
Representativeness of the cases	*
Selection of controls	*
Definition of controls	
Comparability	
Controls for age or others factors[*]	
Exposure	
Ascertainment of exposure	
Same method of ascertainment for cases and controls	*
Non-response rate	
Total stars[†]	4

[*] Other factors included: demographic factors (gender, level of education), lifestyle factors (tobacco) and presence of co-morbidity

[†] A study can be awarded a maximum of one star for each numbered item within the selection and outcome sections. A maximum of two stars can be given for comparability (one star for controlling for age and one star for controlling for any others factors). A maximum of 9 stars is allowed for each study.

SUPPLEMENTARY DATA

Supplementary Table 5. Results of included studies on the impact of type 2 diabetes on absenteeism with a high risk of bias

Authors	Sex	Study population Diabetes	No diabetes	Outcome Definition	Data collection instrument	Statistical method	Adjustment variables	Results Summary measure	95% CI	% of people with the outcome	Days lost/year	Quality score
		N	N					(D/no D)		(D/no D)	(D/no D)	
Cohort												
daCosta Dibonaventura et al., 2011(16)	F-M	1037	8162	Percentage of time lost from work in the past 7 days due to illness	WPAI	GEE	A B C E S I R Q	Mean= 3.49%/ 4.74%* / 2.91% [†]	-		8.8, 11.9*/ 7.3 [‡]	4
		290*										
Vijan et al., 2004 (5)	F-M	N/A	N/A	Days of work lost in the previous year	Questionnaire[§]	Two-part reg.	A E S M R	2.4 more days lost in the previous year[†]	-		2.7 / 2.4	4
Case-control												
Robinson et al., 1990 (35)	F-M	2104	1602	Any time of work lost due to illness in the previous year	Questionnaire	-	-	RR=1.09[ǁ]	-	49.0/45.0	-	4
	F-M	1999		> 10 days of work lost in the previous year				RR=1.46[§]	-	57.0/39.0	-	
	F-M	161		> 20 days of work lost due to illness in the previous year				RR=1.81[§]	-	29.0/16.0	-	
Cross-												

SUPPLEMENTARY DATA

Authors	Sex	Study population Diabetes	No diabetes	Outcome Definition	Data collection instrument	Statistical method	Adjustment variables	Results Summary measure	95% CI	% of people with the outcome	Days lost/year	Quality score
		N	N					(D/no D)		(D/no D)	(D/no D)	
sectional												
Holden et al., 2011 (20)	F-M	1478	72,417	Whole or half days lost from work in the previous 4 weeks	WHO-HPQ§	Negative binomial reg.	A C C_{23} C_{24} E I M S U Q_1-Q_8	IRR=0.89†	0.83-0.96	-	N/A	2
Collins et al., 2005 (29)	F-M	189	N/A	Hours of work lost in the past 4 weeks	SPS	Logistic reg.	A C C_{19} Q_8 Q_{13} O R S T	OR=1.2	-		16.3 / N/A	2
Boles et al., 2004 (14)	F-M	67	2 197	Percentage of time work lost due to illness in the past 7 days	WPAI	Logistic reg.	A B C_{16} C_{18} C_{21} D S H P T V X Z	OR=2.29†	1.17-4.47	-	10.6 / 4.2 ‡	2
Vijan et al., 2004 (5)	F-M	N/A	N/A	Days of work lost in the previous year	Questionnaire§	Logistic reg.	A E S M R	OR=1.3	1.1-1.7		4.0 / 6.6†	3
Lavigne et al., 2003 (32)	F-M	N/A	N/A	Whole or half days lost from work in the past 4 years	HLQ	Poisson reg.	A E S M P R $C_1$$C_3$K Q_9-Q_{12} W_1	1.18 more days lost per month	-		N/A	2
Kessler et al., 2001 (31)	F-M	77	1996	Days of work lost due to illness or work-cutback days in the past 4 weeks	Questionnaire	Logistic reg.	A C E O S	OR=1.1	0.6-1.9		45.0/N/A	2
Burton et al., 1999 (15)	F-M	15	549	Hours of work lost due to illness per week	OMNI	ANOVA	-	Mean= 0.49 hours lost per week†	-		3.0 / N/A	2
				Hours of works lost due to short time disability per	OMNI	ANOVA	-	Mean= 2.15 hours lost per	-		32.5 / N/A	1

SUPPLEMENTARY DATA

Authors		Study population		Outcome		Statistical method	Adjustment variables	Results					Quality score
	Sex	Diabetes	No diabetes	Definition	Data collection instrument			Summary measure	95% CI	% of people with the outcome	Days lost/year		
		N	N					(D/no D)		(D/no D)	(D/no D)		
				week				week[†]					

ANOVA: analysis of variance; CI: confidence interval; D: diabetes; F:female; GEE: generalized estimating equation; HLQ: Health labor questionnaire; M; male; N/A: not available; OMNI: occupational medical and nursing information system; OR: odds ratio; IRR: incidence rate ratio; reg: regression; RR: relative risk; SPS: Stanford Presenteeism Scale; WPAI: Work Productivity and Activity Impairment questionnaire; WHO-HPQ: World Health Organisation Health and Productivity Questionnaire

A:age; A^2: age^2; B:body mass index; B_1:weight; B^2: body mass $index^2$; C:co-morbidities; C_1:depression; C_2:depression and diabetes; C_3:hypertension; C_4:allergy; C_5:arthritis; C_6:asthma; C_7:back pain; C_8:cancer; C_9:heart disease; C_{10}:heartburn; C_{11}:irritable bowel; C_{12}:kidney disease; C_{13}:menopause; C_{14}:osteoporosis; C_{15}:diabetes; C_{16}:cholesterol; C_{17}:chronic obstructive pulmonary disease; C_{18}:congestive heart failure; C_{18}:blood pressure; C_{19}:biometrics; C_{20}:number of health condition; C_{21}:total health risk; C_{22}:health status; C_{23}:occasions of treatment for any reason except pregnancy; C_{24}:not treatment for a specific condition; C_{25}: self-perceived health; D:Diet; E:education; F:region of residence; F2:urban area; H:alcohol use; I: income; I_1:log of other household income; I_2:own home; J: diabetes severity; K:year since diabetes diagnosis; L: immigration status; L_1: years since immigration; L_2: english proficiency; M : marital status; M_1: household head; N:medical cost; O:occupation; P:physical activity/inactivity; Q:employment; Q_1:work-related factors of occupation; Q_2:industry; Q_3: public/private sector; Q_4:job security contractor; Q_5: workplace accidents per 100 workers in the previous 4 weeks; Q_6:supervisory role; Q_7:hours expected to work in a 7-day week by their employer; Q_8:hours worked per week; Q_9:employed at a major US corporation; Q_{10}:number of jobs worked; Q_{11}:shift work; Q_{12}:job satisfaction; Q_{13}: plan location; Q_{14}:type of work; Q_{15}:occupational grade at the hiring; R:race; S:sex; T:tobacco use; U:children; V:lack of emotional fulfillment; W:calendar year; X: overdue or preventive visits; X_1:primary caregiver; X_2:Health insurance; Y:interaction term; Y_1:Error term; Z:stress.

*Painful diabetes with peripheral neuropathy

[†] p< 0.05

[‡] Days lost per year were calculated by assuming that individuals were working 40 hours per week and 50 weeks a year

[§] Information obtained from the official survey website

[II] RR was calculated based on information provided in the articles

SUPPLEMENTARY DATA

Supplementary Table 6. Results of included studies on the impact of type 2 diabetes on presenteeism with high risk of bias

Authors	Sex	Study population		Outcome		Statistical method	Adjustment variables	Results				Quality score
		Diabetes	No diabetes	Definition	Data collection instrument			Summary measure	95% CI	% of people with the outcome	Days lost/year	
		N	N					(D/no D)		(D/no D)	(D/no D)	
Cohort												
daCosta Dibonaventura et al., 2011(16)	F-M	1037	8162	Percentage of time impaired at work due to illness in the past 7 days	WPAI	GEE	A B C E S I R Q	Mean= 13.52% / 17.84%* / 12.78% †	-	-	33.8, 44.4* / 31.9 ‡	4
		290*							-			
Cross-sectional												
Holden et al., 2011 (20)	F-M	1449	70,990	Performance in the past 4 weeks (score)	WHO-HPQ§	Multinomial logistic reg.	A C C_{23} C_{24} E I M S U Q_1-Q_8	RRR=0.92	0.75-1.13	-	N/A	2
Boles et al., 2004 (14)	F-M	67	2197	Percentage of time impaired at work due to illness in the past 7 days	WPAI	Logistic reg.	A B C_{16} C_{18}, C_{21} D G H P T V X Z	OR=1.27	0.72-2.23	-	23.1/16.2 ‡	2
Lavigne et al., 2003 (32)	F-M	N/A	N/A	Work efficiency losses due to working while feeling unwell in the past 4 weeks	HLQ	Tobit reg.	A E S M P R C_1 C_3 K Q_9- Q_{12} W_1	Work efficiency reduced by 0.87 hours per month	-	10 / 15	N/A	2

CI: confidence interval; D: diabetes; F: female; GEE: generalized estimating equation; HLQ: Health labor questionnaire; M: male; N/A: not available; OR: odds ratio; reg: regression; RRR: relative risk ratio; WPAI: Work Productivity and Activity Impairment questionnaire; WHO-HPQ: World Health Organisation Health and Productivity Questionnaire

Adjustment variables: see Supplemental Table S_5 legend

*Painful diabetes with peripheral neuropathy

† p< 0.05

‡ Days lost per year were calculated by assuming that individuals were working 40 hours per week and 50 weeks a year

§ Information obtained from the official survey website

SUPPLEMENTARY DATA

Supplementary Table 7. Results of included studies on the impact of type 2 diabetes on productivity with high risk of bias

Authors	Sex	Study population Diabetes	No diabetes	Outcome Definition	Data collection instrument	Statistical method	Adjustment variables	Results Summary measure	95% CI	% of people with the outcome	Days lost/year	Quality score
		N	N					(D/no D)		(D/no D)	(D/no D)	
Cohort												
daCosta Dibonaventura et al., 2011(16)	F-M	1037	8162	Percentage of time lost from work plus percentage of time impaired at work due to illness in the past 7 days	WPAI	GEE	A B C E S I R Q	Mean= 13.75% / 19.77%* / 13.17% †	-	-	34.4, 49.4* / 33.1 ‡	4
		290*										
Cross-sectional												
Lenneman et al., 2011 (33)	F-M	N/A	N/A	Percentage of productivity impairment at work in the past 4 weeks	WPAI	Linear reg.	C_1 C_{16}-C_{18} D P T Z	1.82% more productivity lost in the past 4 weeks	0.72-2.82	-	N/A	1
Kannan et al., 2008 (30)	F-M	3 576	16,183	Work time lost from work plus time impaired or reduced at work due to illness in the past 7 days (score)	WPAI	Linear reg.	A S R T C_3 C_{16}	Strong association between diabetes and work productivity loss score (B=7.57)†	-	-	N/A	2
Burton et al., 2004 (28)	F-M	479	16,172	Time management in the previous 2 weeks	WLQ	Logistic reg.	A$C_1$$C_3$-$C_{14}$ S	OR=1.40†	1.14-1.73	30.5/N/A	N/A	2
				Physical work activities in the	WLQ	Logistic reg.	A$C_1$$C_3$-$C_{14}$ S	OR=1.42†	1.15-1.75	29.4/N/A	N/A	

				previous 2 weeks							
				Mental/inter-personal activities output in the previous 2 weeks				OR=1.23	1.02-1.50	43.2/N/A	N/A
				Overall output in the previous 2 weeks				OR=1.16	0.95-1.42	35.3/N/A	N/A
Lavigne et al., 2003 (32)	F-M	N/A	N/A	Whole or half days lost from work plus work efficiency losses in the past 4 weeks	HLQ	Tobit reg.	A E S M P R C_1 C_3 KQ_9-Q_{12} W_1	8.23 more days lost per month	-	-	N/A	2

CI: confidence interval; D: diabetes; F: female; GEE: generalized estimating equation; M: male; N/A: not available; OR: odds ratio; reg: regression; WLQ: Work Limitations Questionnaire; WPAI: Work Productivity and Activity Impairment questionnaire

Adjustment variables: see Supplemental Table S_5 legend

*Painful diabetes with peripheral neuropathy

† p< 0.05

‡ Days lost per year were calculated by assuming that individuals were working 40 hours per week and 50 weeks a year

SUPPLEMENTARY DATA

Supplementary Table 8. Results of included studies on the impact of type 2 diabetes on retirement with high risk of bias

Authors		Study population		Retirement		Statistical method	Adjustment variables	Results				Quality score
	Sex	Diabetes	No diabetes	Definition	Data collection instrument			Summary measure	95% CI	% of people with the outcome	Years retired earlier	
		N	N					(D/no D)		(D/no D)	(D/no D)	
Cohort												
Vijan et al., 2004 (5)	F-M	N/A	N/A	N/A	Questionnaire*	Two-part reg.	A S E M R	N/A	N/A	12.0/9.0	Retired 0.14 years earlier[†]	4
Cross-sectional												
Vijan et al., 2004 (5)	F-M	N/A	N/A	N/A	Questionnaire*	Logistic reg.	A S E M R	OR=1.3	1.0-1.07	-	Retired 0.12 years earlier[†]	3

CI: confidence interval; D: diabetes; F: female; M: male; N/A: not available; OR: odds ratio; reg: regression

Adjustment variables: see Supplemental Table S_5 legend

* Information obtained from the official survey website

[†] p< 0.05

SUPPLEMENTARY DATA