

# The impact of office on employees' health



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# Health in this research?

*Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.*

(WHO definition)





# Office in this research?

- Office interior
  - Scattered field
  - Layout, furniture, plants, etc.



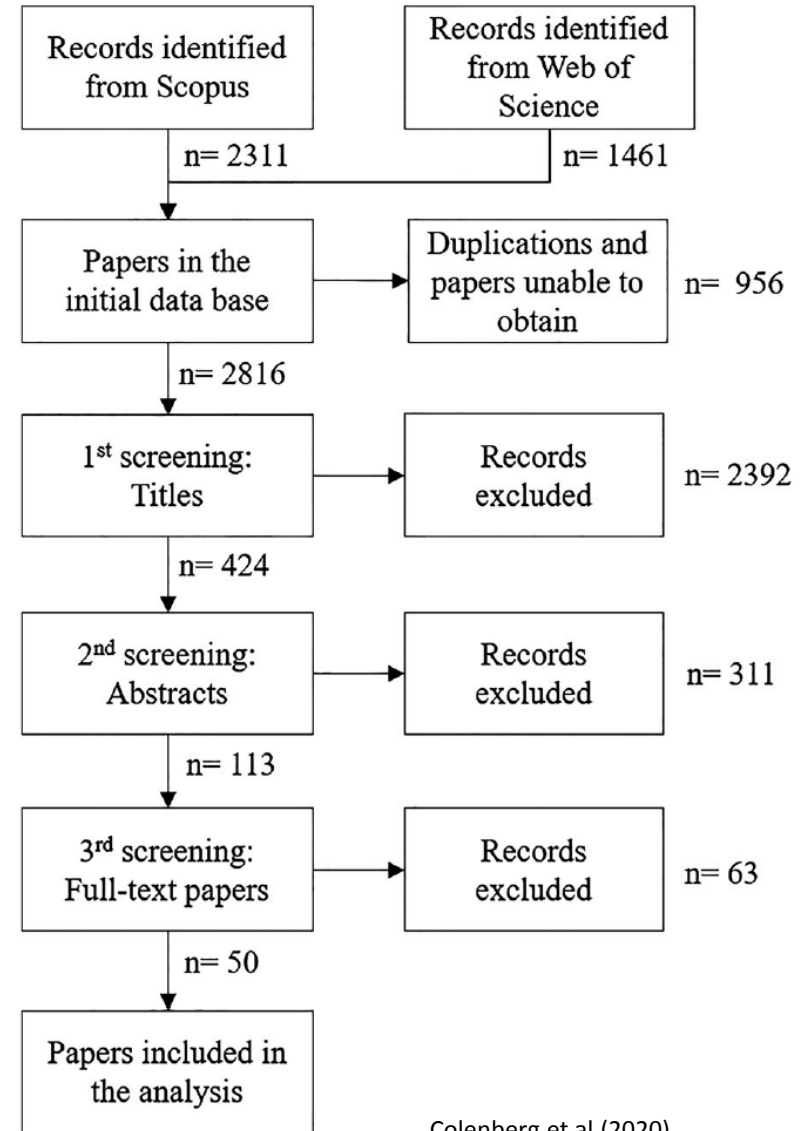
# Systematic literature review

**Initial database:**  
3772 papers

**3 scans:**  
Titles, abstracts, full papers

**Inclusion criteria:**  
(1) Office interior  
(2a) Physical health and/or (2b) mental health  
and/or (2c) social well-being

**In the final analysis:**  
50 papers (including quality appraisal provided by Centre for  
Evidence Based Management)



Colenberg et al.(2020)

# The 50 papers

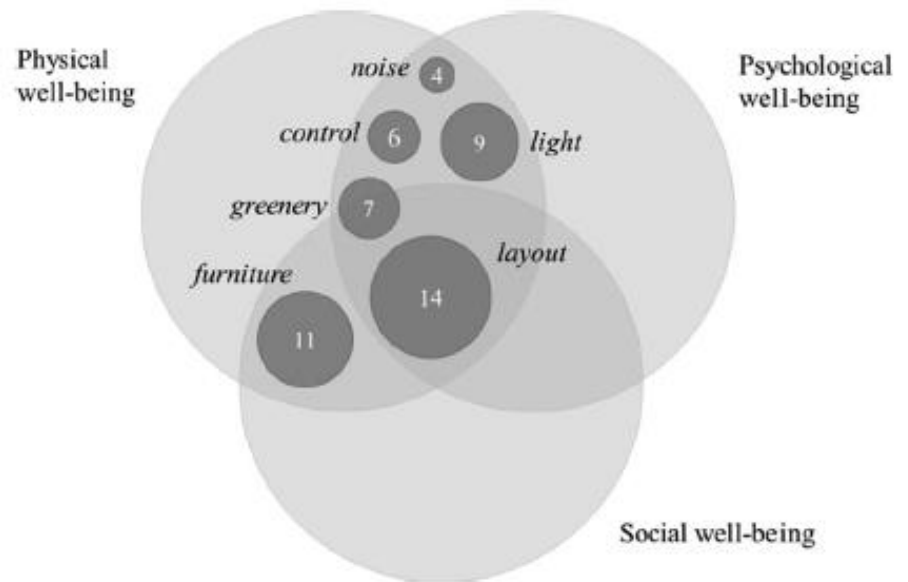
## Published

- over the past 5 years: more than half of the papers
- over the past 10 years: 80 % of the papers

The office type, where the evidence was collected, was unclear:

Half of the papers

Predominantly focus on physical health:



Colenberg et al.(2020)

Tabel 1: Samenvatting gezondheidsinvloeden kantoorinterieur.

	Fysieke gezondheid							Mentaal			Sociaal
	Verzuim	Medische indicatoren	Lichamelijke klachten	Lichamelijk comfort	Slaap-kwaliteit	Eigen oordeel gezondheid	Gevoel van stress	Stemming	Ergernis	Relaties op het werk	
<b>Indeling</b>	Eenpersoonskamer	☺	-	☺	☺	-	-	-	☺	☺	
	Gedeelde kamer	☺	-	☹	-	-	-	-	☺	☺	
	Cubicle (hoge schotten)	-	☺	-	-	-	-	☹	-	-	
	Open werkruimte	☹	☺	☹	☹	-	-	☹	-	☹	
	Activiteit-gerelateerde werkomgeving	-	-	☺	-	-	☺	-	-	-	
	Verder lopen naar pantry/wc	-	☺	-	-	-	-	-	-	-	
<b>Meubilair</b>	Activerend	-	☺	☺	☺	-	☺	-	-	☺	
	Ergonomisch	-	-	☺	☺	-	-	-	-	-	
<b>Licht</b>	Meer daglicht (echt/gesimuleerd)	-	-	☺	☺	☺	☺	-	☺	-	
	Meer/beter licht	-	-	☺	☺	-	-	-	☺	-	
	Speciale verlichting	-	-	☺	☺	☺	☺	-	☺	-	
<b>Groen</b>	Planten op werkplek	-	☺	☺	☺	-	☺	-	-	-	
	Uitzicht op natuur (echt/gesimuleerd)	-	☺	-	-	-	-	☺	-	☺	
<b>Invloed</b>	Regelmogelijkheden	-	-	☺	☺	-	☺	-	-	-	
	Personalisatie	-	-	-	-	-	☺	-	☺	-	
<b>Geluid</b>	Meer achtergrondgeluid	-	☹	☹	-	-	-	-	-	☹	
	Betere akoestiek	-	☺	-	-	-	-	☺	-	☺	

☺ Overwegend positief voor gezondheid; ☹ overwegend negatief;  
 ☺ geen/wisselend effect; - niet (apart) onderzocht

Tabel 1: Samenvatting gezondheidsinvloeden kantoorinterieur.

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	😊	-	😊	😊	-	-	-	-	😊	😊	
	😊	-	😞	-	-	-	-	-	😊	😊	
<b>Indeling</b>	-	😊	-	-	-	-	😞	-	-	-	
	😞	😊	😞	😞	-	-	😞	-	😞	😞	
	-	-	😊	-	-	😊	-	-	-	-	
	-	😊	-	-	-	-	-	-	-	-	
<b>Meubilair</b>	-	😊	😊	😊	-	😊	-	-	-	😊	
	-	-	😊	😊	-	-	-	-	-	-	
<b>Licht</b>	-	-	😊	😊	😊	😊	-	😊	-	-	
	-	-	😊	😊	-	-	-	😊	-	-	
	-	-	😊	😊	😊	😊	-	😊	-	-	
<b>Groen</b>	-	😊	😊	😊	-	😊	-	-	-	-	
	-	😊	-	-	-	-	😊	-	😊	-	
<b>Invloed</b>	-	-	😊	😊	-	😊	-	-	-	-	
	-	-	-	-	-	😊	-	😊	-	-	
<b>Geluid</b>	-	😞	😞	-	-	-	-	-	😞	-	
	-	😊	-	-	-	-	😊	-	😊	-	

😊 Overwegend positief voor gezondheid; 😞 overwegend negatief;  
 😊 geen/wisselend effect; - niet (apart) onderzocht



# Layout

- Main interest: open-plan office vs. room
- Larger space tends to increase the negative impact on health<sup>1</sup>. However, this is typically measured by 'self-rated health'.
- Social well-being was rarely studied



<sup>1</sup> e.g., Pejtersen et al. (2006)

# Layout - Open plan office

Open-plan was associated to have a negative impact on e.g.

- self-reported health symptoms<sup>1</sup>, e.g.,
    - headache
    - fatigue
    - throat, eye, nose irritation
  - noise annoyances and disturbances<sup>2</sup>
  - social well-being<sup>3</sup>
  - sickness absence<sup>4</sup>
- } Physical health symptoms
- } Mental well-being

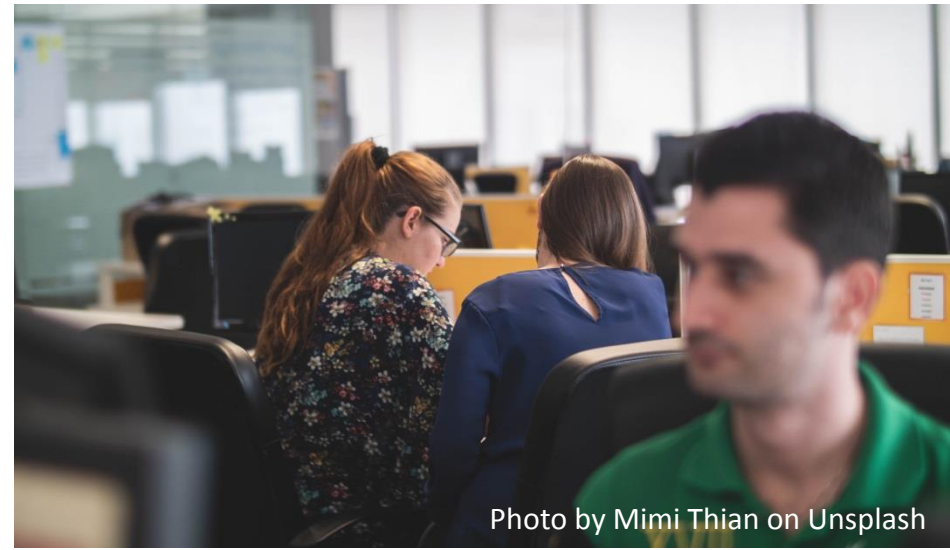


Photo by Mimi Thian on Unsplash

<sup>1</sup> e.g., Pejtersen et al. (2006)

<sup>2</sup> e.g., Torbeyns et al. (2016)

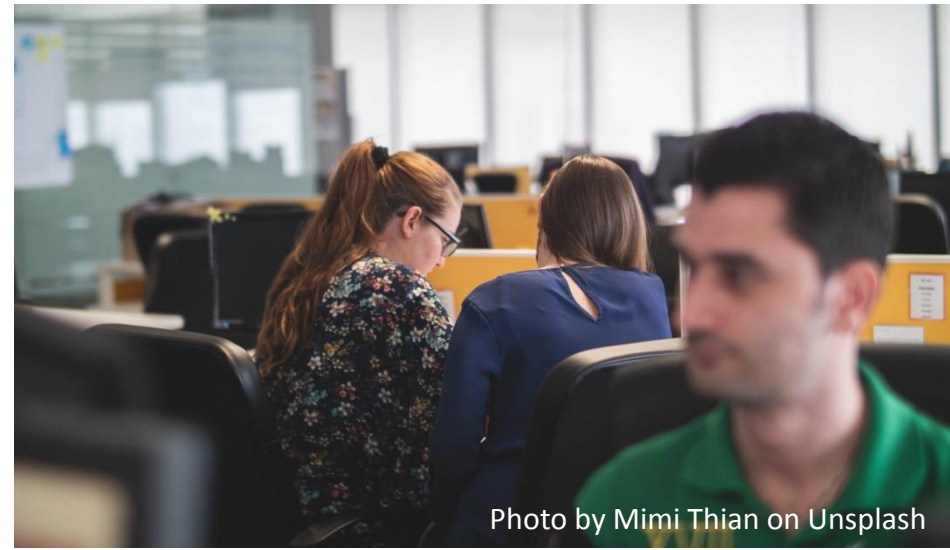
<sup>3</sup> e.g., Roossien et al. (2017), Brennan et al. (2002)

<sup>4</sup> e.g., Bodin Danielson et al. (2014)

# Layout - Open plan office

Open-plan was associated to have a positive impact on

- Sedentary breaks<sup>1</sup>



<sup>1</sup>Duncan et al. (2015)



# Plants & Nature view



Plants

Outdoor nature view

Artificial nature views

Hypothesis:

plants and views have positive  
impact on health

# Plants & Nature view



Mixed evidence:

- Some studies found positive association between plants and health<sup>1</sup>, some studies did not<sup>2</sup>
  - When found, the impact was seen e.g. in
    - tiredness
    - sleep quality
    - vitality

} Physical health symptoms

    - mood

} Mental well-being

    - social well-being
- No negative impact

<sup>1</sup> e.g., Bjørnstad et al. (2014); Fjeld (2000)

<sup>2</sup> e.g., Evensen et al. (2015)



# Plants & Nature view



Mixed evidence:

- Some studies found positive association between views and health<sup>1</sup>, some studies did not<sup>2</sup>
  - When found, the impact was seen e.g. in
    - physical stress
    - sleep quality
    - vitalityPhysical health symptoms
  - Mood
  - social well-being
  - sickness absence
- Mental well-being

→ No negative impact

<sup>1</sup> e.g., Bjørnstad et al. (2014); Kahn et al. (2008)

<sup>2</sup> e.g., Xue et al. (2016)



# Individual control

- (1) Possibility to adjust the conditions in work environment
- (2) Personalisation

Positive association between individual control and psychological well-being (and physical well-being).



**Open access publication:** Colenberg, S., Jylhä, T. and Arkesteijn, M. (2020) The relationship between interior office space and employee health and well-being – a literature review, *Building Research & Information*, doi.org/10.1080/09613218.2019.1710098

**Table 8.** Summary of the relation between interior office space and health.

		Physical well-being										Psychological well-being				Social well-being				
		Sickness absence	Physiological stress indicators	Cardio-metabolic risk factors / fat	Musculo-skeletal issues	Skin/eye/nose/throat irritation	Tiredness/fatigue/alertness	Headache/nausea/dizziness	Visual comfort	Thermal comfort	Unpleasant odour	Overall comfort	Sleep quality/duration	Self-rated health/vitality	Perceived stress	Mood/depression/anxiety	General annoyance/anger	Noise annoyance/disturbances	Crowding/privacy	Inter-personal relations
Layout	Workspace openness/size																			
	Shared vs. single room <sup>1,2,3</sup>	-																		
	Open-plan <sup>2,4,5,7,8,9</sup>	-		+																+
	Activity-based (mix) <sup>10,11</sup>				+		0							±						
	Open bench vs. cubicle <sup>12</sup>		0												+					
Furniture	Open bench vs. private <sup>12</sup>		0												0					
	Distance to facilities																			
	Dist. to bathroom/kitchen <sup>13, 14</sup>			+	(+)															
	Activating desks																			
	Sit-stand desk <sup>15, 16, 17, 18, 19, 20</sup>			+/-	+/-			+					0	0						
Light	Bike desk <sup>21</sup>			+	0															0
	Ergonomic chairs																			
	Feedback chair <sup>22</sup>				0															
	Adjustable chair <sup>20,21,24,25</sup>				(+)			(+)					0							
	Natural light																			
Greenery	Amount of daylight <sup>26,27</sup>	(+)											+	+		(+)				
	Electrical lighting																			
	Light level/quality <sup>13,14,28,29,30,31</sup>		(+)		(+)		0	(+)					+			(+)				
	Dynamic lighting <sup>32</sup>							0	0				0	0		0				
	Indirect lighting <sup>33</sup>				0			0	0				0	0		0				
Control	Blue-enriched light <sup>34</sup>												+			+				
	Real nature																			
	Plants <sup>35,36,37</sup>	(+)	+/-		+/-		+/-	+	0				+	(+)	+	(+)				(+)
	Outdoor nature views <sup>26,40</sup>		+																	
	Artificial nature																			
Noise	Artificial nature views <sup>38,39</sup>		0													+				
	Options for adjustment																			
	Climate controls <sup>41,42,43,44</sup>					+/-	+/-	+/-	+	+			+							
	Adjustable task lighting <sup>46</sup>				+				+				0							
	Identity marking																			
Noise	Personalization <sup>45</sup>												+		+					
	Background noise level <sup>13,14,47,48,49</sup>		0/-		(-)															
	Speech intelligibility <sup>48,49</sup>		0																	
	Sound absorption <sup>50</sup>																			+

+ Better health, - worse health; 0 no relationship; () result in combination with other design features; [grey color] result of >1 study.

<sup>1</sup> Jaakkola and Heino (1995); <sup>2</sup> Morrison and Macky (2017); <sup>3</sup> Pejtersen et al. (2011); <sup>4</sup> Bodin Danielsson et al. (2014); <sup>5</sup> Bodin Danielsson et al. (2015); <sup>6</sup> Brennan et al. (2002); <sup>7</sup> Pejtersen et al. (2006); <sup>8</sup> Duncan et al. (2015); <sup>9</sup> Haapakangas et al. (2018) <sup>10</sup> Meijer et al. (2009); <sup>11</sup> Foley et al. (2016); <sup>12</sup> Lindberg et al. (2018); <sup>13</sup> Engelen et al. (2017); <sup>14</sup> Engelen et al. (2016); <sup>15</sup> Karakolis and Callaghan (2014); <sup>16</sup> Robertson et al. (2013); <sup>17</sup> Carr et al. (2016); <sup>18</sup> Graves et al. (2015); <sup>19</sup> Healy et al. (2013); <sup>20</sup> Grooten et al. (2017); <sup>21</sup> Torbeyns et al. (2016); <sup>22</sup> Roossien et al. (2017); <sup>23</sup> Van Niekerk et al. (2012); <sup>24</sup> Robertson et al. (2009); <sup>25</sup> Amick et al. (2012); <sup>26</sup> Bjarnstad et al. (2016); <sup>27</sup> Boubekri et al. (2014); <sup>28</sup> Van Duijnhoven et al. (2018); <sup>29</sup> Thayer et al. (2010); <sup>30</sup> Lamb and Kwok (2016); <sup>31</sup> Veitch et al. (2008); <sup>32</sup> De Kort and Smolders (2010); <sup>33</sup> Fostervold and Nersveen (2008); <sup>34</sup> Viola et al. (2008); <sup>35</sup> Fjeld (2000); <sup>36</sup> Evensen et al. (2015); <sup>37</sup> Qin et al. (2014); <sup>38</sup> Kahn et al. (2008); <sup>39</sup> Kweon et al. (2008); <sup>40</sup> Xue et al. (2016); <sup>41</sup> Toftum (2010); <sup>42</sup> Boerstra et al. (2015); <sup>43</sup> Bluyssen et al. (2011); <sup>44</sup> Knight and Haslam (2010); <sup>45</sup> Wells (2000); <sup>46</sup> Joines et al. (2015); <sup>47</sup> Jahncke et al. (2011); <sup>48</sup> Schlittmeier and Liebl (2015); <sup>49</sup> Shafiq Motlagh et al. (2018); <sup>50</sup> Seddigh et al. (2015).

# To conclude

Research is fragmented and in a nascent state.

More evidence-based research needed.

(1) Avoiding negative influence.

(2) Physical and mental recovery at the office.

Social well-being: The COVID-19 pandemic & lack of social bonding





T H A N K



Y O U