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CLINICAL RESEARCH ARTICLE

Association between feeling threatened by a terrorist attack and subjective health: a web survey a week after the attacks of 22 March 2016 in Belgium

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ABSTRACT

Background: The wave of terrorist attacks over the past years in Europe and other regions may cause problems such as anxiety and depressive symptoms. Some studies suggest that perceived threat might also trigger physical health problems.

Objective: To investigate the association between feeling threatened and subjective health during the week following a terrorist attack.

Method: Online survey with a self-selected sample in the Belgian population one week after the terrorist attacks in 2016. Participants were invited through the Belgian media to fill in a questionnaire in Dutch, French or English on a website. The main outcomes were the association between 'feeling threatened' and subjective health problems. Perceived threat was measured with the question 'During the week after the attacks … Did you feel threatened?' Subjective health was measured by using standardized scales (ACSA, PHQ-4, PHQ-15).

Results: A total of 2620 respondents completed the questionnaire, of whom 69.8% were female, 27.7% lived and 43.1% worked in Brussels. Gender, age, place of living and working, media exposure, religiousness and religious affiliation were associated significantly with higher perceived threat. A total of 21% of the respondents felt much or very much threatened during the week after the attacks. They reported significantly higher levels of mental and physical health problems. The most frequently reported problems were anxiety and depressive symptoms. The health problems that differentiated most markedly between those with low and high levels of perceived threat were fainting spells, chest pain and shortness of breath.

Conclusion: In a self-selected sample of respondents, 'feeling threatened' was strongly associated with lower level of wellbeing and higher levels of mental and physical health problems. The most prevalent health problems were mental health problems but the most pronounced differences between people with low versus high levels of perceived threat were physical health problems.

Asociación entre sentirse amenazado por un acto terrorista y salud subjetiva: Una encuesta vía web una semana después del ataque del 22 de marzo del 2016 en Bélgica.

Antecedentes: La ola de ataques terroristas en los últimos años en Europa y otras regiones puede causar problemas, tales como síntomas ansiosos y depresivos. Algunos estudios sugieren que la percepción de amenaza puede gatillar problemas de salud física.

Objetivo: Investigar la asociación entre el sentimiento de amenaza y la salud subjetiva durante la semana siguiente a un ataque terrorista.

Método: Una encuesta en línea con una muestra auto- seleccionada en la población Belga una semana después del ataque terrorista del 2016. Los participantes fueron invitados a través de los medios belgas a llenar un cuestionario en holandés, francés o inglés en un sitio web. Los resultados principales fueron la asociación entre 'el sentirse amenazado' y problemas de salud subjetivos. La amenaza percibida fue medida con la pregunta ¿"Durante la semana posterior a los ataques.se sintió amenazado?". La salud subjetiva fue medida usando escalas estandarizadas (ACSA, PHQ-4, PHQ-15).

Resultados: 2.620 encuestados completaron el cuestionario, de los cuales 69,8% eran mujeres, 27,7% vivía en Bruselas y 43,1% trabajaba en esa ciudad. El género, la edad, lugar donde vive y trabaja, la exposición a los medios, religiosidad y pertenencia a una religión estuvieron asociados significativamente con mayor percepción de amenaza. Veintiún por ciento de los encuestados se sentían muy o mucho más amenazado durante la semana posterior a los ataques. Ellos reportaron niveles significativamente más elevados de problemas de salud mental y física. Los problemas más frecuentemente reportados fueron síntomas de ansiedad y depresivos. Los problemas de salud que diferenciaba más

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关键词
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HIGHLIGHTS

- In a self-selected sample of respondents, one week after a terrorist attack, 'feeling threatened' was strongly associated with higher levels of mental and physical health problems.
- Three-quarters of the people who felt threatened reported at least a moderate level of mental or physical health problems.
- The most pronounced differences between people with low versus high levels of perceived threat were some physical health problems.

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marcadamente entre aquellos con niveles bajos y altos de percepción de amenaza fueron desmayos, dolor en el pecho, y dificultades para respirar.
Conclusiones: En una muestra auto-seleccionada de encuestados, el 'sentirse amenazado' se asoció fuertemente con niveles más bajos de bienestar y niveles más altos de problemas de salud mental y física. Los problemas de salud más prevalentes fueron los problemas de salud mental, pero las diferencias más pronunciadas entre las personas con niveles bajos versus niveles altos de amenaza percibida fueron los problemas de salud físicos.

恐怖袭击威胁与主观健康的关联：2016年3月22日比利时袭击发生一周后的一项网络调查

背景：最近几年在欧洲和其他地区出现的恐怖袭击浪潮可能会引发诸如焦虑和抑郁症状等问题。一些研究表明，感到威胁也可能引发身体健康问题。

目的：考察恐怖袭击后一周时间内感到威胁与主观健康之间的关系。

方法： 2016年恐怖袭击发生一周后，在比利时人群体中自选一批样本并完成了网络问卷。通过比利时媒体邀请参加者用荷兰语、法语或英语在网页上完成一份问卷。 主要结果是'感觉到威胁'和主观健康问题之间的关联。问卷中设置'在袭击发生的一周内，你感受到威胁吗？'这个题目测量感知威胁，使用标准化的量表（ACSA，PHQ-4，PHQ-15）来测量主观健康。

结果：有 2620名受访者完成了调查问卷，其中69.8％为女性，27.7％居住在布鲁塞尔，43.1％在布鲁塞尔工作。性别、年龄、生活和工作地点、媒体曝光度、宗教信仰和宗教归属都与感知到更多威胁显著相关。 21％的受访者在袭击发生后一周内感受到了较多或非常多的威胁，并报告了更高水平的精神和身体健康问题。报告最多的问题是焦虑和抑郁症状。那些感知威胁较高和较低者之间差异最明显的健康问题是晕厥、胸痛和呼吸短促。结论：在自选的受访者样本中，'感觉到威胁'与幸福感较低和身心健康问题较多密切相关。最普遍的健康问题是心理健康问题，但感知威胁较低与较高水平的人群之间最明显的差异是身体健康问题。

1. Background

Terrorist attacks are fundamentally different from other catastrophes (Stein et al., 2004). A review of 160 catastrophes demonstrated more negative mental health responses following terrorist disasters than following natural or technical disasters (Norris, Friedman, & Watson, 2002). Emotional distress, anxiety and depressive symptoms are common reactions in populations directly affected by terrorist attacks (Chen, Chung, Chen, Fang, & Chen, 2003; Ford, Adams, & Dailey, 2007). In the three to five days after the attacks on 11 September 2001 in the US, 44% experienced substantial stress reactions, 90% experienced at least low levels of stress and 47% reported increased anxiety and fear (DiMaggio & Galea, 2006; Schuster et al., 2001). Vulnerable persons may develop more serious psychological consequences. Of the people living in the regions of the attacks, 9.4% met criteria for depression and 7.5% for post-traumatic stress disorder (PTSD) (Galea et al., 2002). Furthermore, when people are anticipating disasters, their fears can worsen existing symptoms (Schuster et al., 2001). In contrast, some studies suggest that habituation may occur, due to continuous exposure to threat, as in Israel (Bleich, Gelkopf, & Solomon, 2003).

Several studies indicate that the effects are not limited to mental health problems. The Worcester Heart Attack study, conducted in a region more than 300 km from New York, suggests that the attacks in New York and on the Pentagon resulted in a significant increase in fatal acute myocardial infarctions (Goldberg et al., 2005; Qureshi, Merla, Steinberg, & Rozanski, 2003). A plausible mechanism linking acute stress responses to cardiac events is that the perceived stress evokes an acute and non-regulated fight-or-flight response that decreases parasympathetic (vagal) tone (Lampert, Baron, McPherson, & Lee, 2002). This may eventually result in detrimental biological effects (Blackburn & Epel, 2012; Gidron, Gilutz, Berger, & Huleihel, 2002).

In the past years, Europe has also been confronted with a wave of attacks. Although the risk of being directly hit by such attacks is quite limited, the perception that anyone can be hit at any moment may engender feelings of threat. Rather than objective factors, such as proximity to the terrorist attack, the perception of threat has a psychological effect (Ford et al., 2007; Hansen, Nissen, & Heir, 2013; Nissen, Birkeland Nielsen, Solberg, Bang Hansen, & Heir, 2015). Although several studies have found an association between exposure and post-traumatic symptoms (Hansen et al., 2013; Heir, Blix, & Knatten, 2016), other studies did not find such association (Bleich et al., 2003; Ford et al., 2007). Subjective perception of threat is a good predictor of probable PTSD (Cukor et al., 2011). These findings point towards the importance of the subjective perception of threat by such attacks. Feeling threatened by terrorist attacks may also induce behavioural changes

that in turn can lead to increased use of cigarettes, alcohol and illegal drugs (Vlahov, Galea, Ahern, Resnick, & Kilpatrick, 2004).

Not everybody is equally at risk of feeling threatened and of the negative consequences this entails. Some categories of people such as women (Bleich et al., 2003; Schuster et al., 2001; Stein et al., 2004), ethnic minorities (Schuster et al., 2001; Stein et al., 2004), people of lower socioeconomic status (Rubin, Brewin, Greenberg, Simpson, & Wessely, 2005), children and people already suffering from chronic disease or pre-existing psychiatric disorders (Schuster et al., 2001) proved to be more vulnerable. A meta-analysis showed that PTSD due to terrorist attacks was more prevalent in Western Europe than in North America (DiMaggio & Galea, 2006). Protective factors that have been reported are older age, social support, being married (Ford et al., 2007) and community characteristics, such as availability of resources, the general sense of support and solidarity (Stein et al., 2013).

Notwithstanding the evidence of the impact of terroristic attacks, most studies are conducted in the US and only a small number of European studies deal with the more recent wave of terrorist attacks (Goodwin, Kaniasty, Sun, & Ben-Ezra, 2017; Hansen et al., 2017, 2013; Heir et al., 2016). As this particular wave of terrorism in Europe is rather recent, the evidence of the impact of terrorism on the population is not so well documented. More specifically, the role of perceived threat on subjective health is less clear. Subjective health is an important indicator because it is strongly associated with morbidity (Goldberg P, 2001) and functional impairment (Kroenke, Spitzer, Williams, & Löwe, 2010). It can reflect the objective health status and serve as a global measure of health status in the general population (Benjamins, Hummer, Eberstein, & Nam, 2004).

The aim of this study was to investigate the association between feeling threatened and subjective health during the week following a terrorist attack.

2. Methods

2.1. Design, participants and measures

We conducted a cross-sectional study using a web survey among a self-selected sample one week after the terrorist attacks in Belgium on 22 March 2016. Participants were invited through the Belgian media (some regional TV stations, radio and some widespread newspapers) to take part in a study using questionnaires in Dutch, French or English. The study was approved by the Medical Ethics Committee of UZ Brussels/VUB (B.U.N. 143,201,526,618).

Threat was measured with the single question 'During the week after the attacks … did you feel threatened?' and a 5-point answer scale (ranging from 'not at all' to 'very much').

Subjective wellbeing was measured by means of the Anamnestic Comparative Self-Assessment (ACSA) scale, where the + 5 and −5 scale anchors respectively reflected respondents' memories of the best and worst period in their whole life (Bernheim, 1999).

Self-reported subjective health problems were measured with two Patient Health Questionnaires. Mental health problems were assessed with the Patient Health Questionnaire-4 (PHQ-4) (Kroenke et al., 2010), a validated tool for detecting anxiety and depression, the two most common mental disorders for which the scores are strongly associated with functional impairment and healthcare use (Cronbach's alpha = .878). Respondents were asked to indicate how often they have been bothered by each symptom in the week following the attacks, on a scale ranging from 'Never' = 0, 'One or a few days' = 1, 'More than half of the week' = 2 to 'Every day' = 3. The total score ranges from 0 to 12 with cut off points of 3, 6 and 9 representing thresholds for mild, moderate and severe symptom levels, respectively.

Self-reported physical health problems were assessed by the Patient Health Questionnaire-15 (PHQ-15) (Kroenke, Spitzer, & Williams, 2002). The PHQ-15 includes 15 symptoms that account for more than 90% of symptoms seen in primary care (exclusive of upper respiratory symptoms) (Cronbach's alpha = .835). Respondents were asked to rate how much they have been bothered by each symptom in the week following the attacks. This was rated as 'Not bothered' = 0, 'Bothered a little' = 1 or 'Bothered a lot' = 2. The total score ranges from 0 to 30 with cut off points of 5, 10 and 15 representing thresholds for mild, moderate and severe symptom levels, respectively.

Attribution of reported subjective wellbeing was measured with the question: 'Have the attacks in Brussels affected your answer to the above question (best – worst time of my life)?' We used a 5-point scale ranging from −5 'I felt much worse' to + 5 'I felt much better by the threat of terrorism'.

Attribution of health problems was measured with the question: 'Do you think the physical/mental problems you listed in the previous question are independent of the attacks and subsequent threat?' We used a 4-point scale ranging from 'completely independent of the attacks and subsequent terrorist threat' to 'fully coherent with the attacks and subsequent terrorist threat'.

In addition, background information (age, gender, working place, place of residence, living situation,

education, professional status, occupation, religiousness, religious affiliation, media exposure) was requested. Media exposure was measured by average number of hours a day viewing information during the week after the terrorist attacks (on the TV, radio, internet, in the newspaper, etc.). Respondents could express their thoughts with the final open question 'Do you have any comments?'

2.2. Statistical analysis

We calculated frequencies of respondents' characteristics and their relationship with the level of feeling threatened, as well as relationships between feeling threatened and wellbeing outcomes. For these analyses, the level of threat was coded as 'high' ('much'/'very much') and 'low' ('none at all', 'a little', 'moderate') threat. For ACSA, PHQ-4 and PHQ-15, we calculated mean scores to test for significant differences according to the level of perceived threat. ACSA was further recoded into five subgroups ranging from worst (−5 or −4) to best (+ 4 or + 5) period of the respondent's life. PHQ-4 and PHQ-15 were recoded into four categories ('none', 'mild', 'moderate' and 'severe' psychological distress and 'minimal', 'low', 'medium' and 'high' level of physical health problems) (Kroenke et al., 2002, 2010). We tested difference in the level of threat by characteristics of the respondents with Chi-square and association between feeling threatened and subjective health with independent *t*-tests. The scores of respondents who did not fill out one or more questions of the scales were treated as missing values. Finally, to test the independent role of perceived threat in health outcomes, we conducted a hierarchical multiple regression, where we controlled for effects of age, gender, education and residence place (block 1), and then entered perceived threat (block 2) in relation to the outcome. All statistical analyses were performed using SPSS version 24.0.

3. Results

3.1. Characteristics of the population

In total, N = 2620 respondents completed the online survey between 29 and 31 March 2016 (Table 1).

Respondents felt very much (5.2%), much (15.8%), moderately (24.4%), a little (31.1%) or not at all (23.4%) threatened during the week after the attacks (not in Table 1).

3.2. Factors associated with feeling threatened

Gender, place of living and working, age, religiousness and media exposure were associated with a high level of threat. There was also a significant difference in threat level as a function of religious affiliation, with larger proportions of Muslims perceiving the highest threat (Table 2).

3.3. Association between feeling threatened and subjective health

Firstly, respondents with high levels of perceived threat reported lower subjective wellbeing. Among respondents with high levels of perceived threat, 36.8% considered the period after the attacks as the worst period of their life (Table 3). Almost three-quarters (72.1%) of respondents in the 'high threat' group attributed their low subjective wellbeing to the threat of terrorism.

Secondly, respondents with high levels of perceived threat also reported substantially more mental health problems (mean score on PHQ-4 scale: 7.99 versus 3.86 compared to those with lower threat levels), and 44.8% of them reported severe symptoms of psychological distress. Of the people perceiving a high threat, 79.9% reported that their symptoms were strongly associated or fully coherent with the attacks.

Thirdly, physical health problems also occurred more often in this group of respondents (mean score on PHQ-15 scale: 9.50 for high perceived threat versus 4.99 for low perceived threat). Almost one in five (18.5%) respondents with high levels of perceived threat reported a high level of physical health problems and half of them indicated that their physical health problems were strongly associated or fully coherent with the threat. Three-quarters (75.5%) of the respondents who experienced high levels of perceived threat reported at least a moderate level of psychological distress (score ≥ 6) or medium level of physical health problems (score ≥ 10).

All of the subjective health problems were more frequent in the group with high levels of perceived threat. The most frequently reported problems were mental health problems (anxiety and depressive symptoms), lack of energy and sleeping problems. However, the subjective health problems that differentiated most markedly between those with high and low perceived threat were fainting spells (3.6 times higher), chest pain (2.4 times higher) and shortness of breath (2.4 times higher) (Table 4).

3.4. Association of perceived threat with subjective wellbeing, mental and physical health problems

We then examined the unique contribution of perceived threat to subjective health outcomes, beyond the role of three confounders, using hierarchical multiple regressions. The latter included age, gender and place of residence (Brussels, elsewhere). Age and gender reflected background information

Table 1. Characteristic of respondents (N = 2620).

	N	%
Gender		
Female	1830	69.8
Male	790	30.2
Age		
18–25	290	11.1
26–45	1297	49.5
46–65	888	33.9
65+	135	5.1
Missing	10	0.4
Living situation		
Alone	536	20.5
With partner	1320	50.4
With another person	417	15.9
Other	341	13.0
Missing	6	0.2
Place of living		
Brussels	725	27.7
Not-Brussels	1887	72.0
Missing	8	0.3
Place of working		
Brussels	1128	43.1
Not-Brussels	1487	56.7
Missing	5	0.2
Education		
Lower secondary or less	240	9.2
Upper secondary	841	32.1
College/university	1539	58.7
Religious affiliation		
Christian	1103	42.1
Liberals	898	34.3
Muslim	41	1.6
Other	467	17.8
Multiple	103	3.9
Missing	8	0.3
Religiousness		
Non-religious	1346	51.4
A little faith	808	30.8
Faithful	378	14.4
Very religious	88	3.4
Media use		
< 1 hour/day	234	8.9
1–2 hours/day	673	25.7
2–3 hours/day	616	23.5
> 3 hours/day	1097	41.9

Table 2. Level of feeling threatened according to characteristics of respondents.

	N= 2620	% Low Threat 79	% High Threat 21	*p*-value
Gender				
Female	1830	76.1	23.9	< 0.001
Male	790	85.7	14.3	
Age				< 0.001
18–25	290	81.0	19.0	
26–45	1297	75.8	24.2	
46–65	888	80.7	19.3	
65+	135	92.6	7.4	
Living situation				0.069
Alone	536	79.3	20.7	
With partner	1320	79.9	20.1	
With another person	417	80.3	19.7	
Other	341	73.6	26.4	
Place of living				
Brussels	725	72.4	27.6	< 0.001
Not-Brussels	1887	81.7	18.3	
Place of working				
Brussels	1128	74.7	25.3	< 0.001
Not-Brussels	1485	82.3	17.7	
Education				
Lower secondary or less	240	73.8	26.3	0.111
Upper secondary	841	79.8	20.2	
College/university	1539	79.3	20.7	
Religious affiliation				
Christian	1103	75.4	24.6	
Liberals	898	85.7	14.3	< 0.001
Muslim	41	65.9	34.1	
Multiple	103	81.6	18.4	
Other	467	75.2	24.8	
Religiousness				
Non-religious	1346	82.5	17.5	
A little faith	808	76.4	23.6	< 0.001
Faithful	378	73.5	26.5	
Very religious	88	72.7	27.3	
Media exposure				
< 1 hour/day	234	90.2	9.8	
1–2 hours/day	673	87.2	12.8	< 0.001
2–3 hours/day	616	81.8	18.2	
> 3 hours/day	1097	69.9	30.1	

known to affect health outcomes. Place of residence reflected an objective estimate of proximity and exposure to the terrorist attacks and this was also significantly related to subjective wellbeing and both health outcomes.

After statistically controlling for the effects of age, gender and place of residence, perceived threat accounted for an additional and significant 20% of the variance in wellbeing, 30% of the variance in mental health problems and 17% of the variance in physical health problems (Table 5).

4. Discussion

In a self-selected sample of respondents, 'feeling threatened' was strongly associated with lower level of wellbeing and higher level of mental and physical health problems. The most prevalent health problems were mental health problems, but the most pronounced differences between people with low versus high levels of perceived threat were physical health problems.

A main finding is that three-quarters of the people in this study who self-identified as feeling much or very much threatened in the week following the terrorist attacks in Brussels felt bad and reported moderate to severe levels of mental or physical health problems (Kroenke et al., 2002, 2010). Some subgroups reported more negative effects: people working or living in the region of the attacks, women and religious people, especially Muslims. Some symptoms, such as fainting spells and chest pain, were more prevalent in the respondents who experienced high levels of threat. Perceived threat was significantly associated with wellbeing as well as mental and physical health, even after statistically controlling for the effects of age, gender and place of residence.

As far as we know, this is the first study exploring self-reported subjective health problems shortly after one of the more recent terrorist attacks in Europe and especially on the role of feeling threatened. By collecting the data shortly after the attacks, recall bias was limited. By using a self-selected online sample, we were able to recruit a large number of respondents

Table 3. Association between feeling threatened and subjective health.

	Total $N = 2620$	Low Threat $N = 2069$	High Threat $N = 551$	Signifi-cance*
Subjective wellbeing				
Mean score on ACSA (SD)	−1.41 (2.02)	−1.03 (1.91)	−2.81 (1.76)	< 0.001
– Worst period of my life (−5 or −4)	362 (13.8%)	159 (7.7%)	203 (36.8%)	< 0.001
– More like the worst period (−3 or −2)	983 (37.5%)	740 (35.8%)	243 (44.1%)	
– Not really like the worst or best period (−1 to 1)	1035 (39.5%)	942 (45.5%)	93 (16.9%)	
– More like the best period (2 or 3)	196 (7.5%)	185 (8.9%)	11 (2.0%)	
– Best period of my life (4 or 5)	44 (1.7%)	43 (2.1%)	1 (0.2%)	
Felt much worse by the threat of terrorism	868 (33.1%)	471 (22.8%)	397 (72.1%)	
Mental health problems				
Mean score on PHQ_4 (SD)	4.72 (3.57)	3.86 (3.16)	7.99 (3.15)	< 0.001
Problems are strongly associated or fully coherent with the attacks and subsequent terrorist threat	1315 (50.2%)	875 (42.3%)	440 (79.9%)	
Categories of psychological distress				
– None (score 0–2)	825 (31.5%)	799 (38.6%)	26 (4.7%)	< 0.001
– Mild (score 3–5)	763 (29.1%)	660 (31.9%)	103 (18.7%)	
– Moderate (score 6–8)	467 (17.8%)	322 (15.6%)	145 (26.3%)	
– Severe (score 9–12)	454 (17.3%)	207 (10.0%)	247 (44.8%)	
Physical health problems				
Mean score on PHQ-15 (SD)	5.92 (5.22)	4.99 (4.59)	9.50 (5.94)	< 0.001
Problems are strongly associated or fully coherent with the attacks and subsequent terrorist threat	652 (24.9%)	376 (18.2%)	276 (50.1%)	
Levels of Physical symptoms				
Minimal (0–4)	1226 (46.8%)	1116 (53.9%)	110 (20.0%)	< 0.001
Low (5–9)	757 (28.9%)	574 (27.7%)	183 (33.2%)	
Medium (10–14)	328 (12.5%)	206 (10.0%)	122 (22.1%)	
High (15 −30)	203 (7.7%)	101 (4.9%)	102 (18.5%)	

* Tested using independent *t*-tests

Table 4. Differences in subjective health according to the level of perceived threat.

	Total $N = 2620$ (%)	Low Threat $N = 2069$ (%)	High Threat $N = 551$ (%)	Ratio	Signifi-cance
Mental health problems					
Feeling nervous or on the edge	2149 (82.0)	1619 (78.3)	530 (96.2)	1.2	< 0.001
Not being able to stop or control worrying	1647 (62.9)	1148 (55.5)	499 (90.6)	1.6	< 0.001
Feeling down, depressed or hopelessness	1638 (62.5)	1155 (55.8)	483 (87.7)	1.6	< 0.001
Little interest or pleasure in doing things	1571 (60.0)	1107 (53.5)	464 (84.2)	1.6	< 0.001
Physical health problems					
Feeling tired or having little energy	1876 (71.6)	1393 (67.3)	483 (87.7)	1.3	< 0.001
Trouble falling or staying asleep, or sleeping too much	1729 (66.0)	1256 (60.7)	473 (85.8)	1.4	< 0.001
Headaches	1092 (41.7)	760 (36.7)	332 (60.3)	1.6	< 0.001
Feeling your heart pound or race	855 (32.6)	566 (27.4)	289 (52.5)	1.9	< 0.001
Stomach pain	733 (28.0)	477 (23.1)	256 (46.5)	2.0	< 0.001
Back pain	817 (31.2)	585 (28.3)	232 (42.1)	1.5	< 0.001
Nausea, gas or indigestion	659 (25.2)	449 (21.7)	210 (38.1)	1.8	< 0.001
Pain in your arms, legs or joints (knees, hips, etc.)	739 (28.2)	545 (26.3)	194 (35.2)	1.3	< 0.001
Dizziness	502 (19.2)	316 (15.3)	186 (33.8)	2.2	< 0.001
Shortness of breath	470 (17.9)	287 (13.9)	183 (33.2)	2.4	< 0.001
Chest pain	442 (16.9)	268 (13.0)	174 (31.6)	2.4	< 0.001
Constipation or diarrhoea	526 (20.1)	361 (17.4)	165 (29.9)	1.7	< 0.001
Menstrual cramps or other problems with your periods (female only $N = 1830$)	206 (11.3)	147 (10.6)	59 (13.5)	1.3	0.013
Pain or problems during sex	188 (7.2)	119 (5.8)	69 (12.5)	2.2	< 0.001
Fainting spells	62 (2.4)	32 (1.5)	30 (5.4)	3.6	< 0.001

who were willing to provide us a thorough insight into how they felt and what they experienced after these tragic attacks.

An obvious limitation of this study is that the sample was not representative. We must be very prudent about generalizing the results. Women and highly educated persons are more highly represented than in the population, for example. It is also unclear whether people who worried most were overrepresented among our respondents. Furthermore, people with less access to or with fewer skills in using the Internet were probably underrepresented. Another limitation is that the reported symptoms were based entirely on self-assessment and that we had no baseline pre-stressor measurement. The cross-sectional design does not enable conclusions about the directionality of observed associations or about cause and effect and neither can we make statements about the evolution of health problems. PHQ measures are often used for research but, to our knowledge, there is limited or no research on the usefulness and validity of the PHQ-4 and PHQ-15 shortly after terrorist attacks.

Although the risk of being directly affected by a terrorist attack might be very low, our findings show that the *perceived* threat is a major factor associated with how people react to such traumatic events. This finding is in line with previous research indicating

Table 5. Hierarchical multiple regressions, testing the unique association of perceived threat with subjective wellbeing, mental and physical health problems, beyond background variables (N = 2620).

Model and variables	B	95% CI	Sig.	R^2
Subjective wellbeing as outcome				
1 Age	0.00	−0.01, 0.00	0.33	
Gender	0.57	0.40, 0.74	< 0.001	
Place of residence (Brussels/not)	0.35	0.18, 0.52	< 0.001	0.02
2. Age				
Gender				
Place of residence (Brussels/not)				
Perceived threat	−0.81	−0.87, −0.74	< 0.001	0.22
Mental health problems as outcome				
1 Age	0.02	0.01, 0.03	< 0.001	
Gender	−1.53	−1.83, −1.23	< 0.001	
Place of residence (Brussels/not)	−0.90	−1.20, −0.59	< 0.001	0.05
2. Age				
Gender				
Place of residence (Brussels/not)				
Perceived threat	1.76	1.66, 1.86	< 0.001	0.36
Physical health problems as outcome				
1 Age	0.01	−0.01, 0.02	0.41	
Gender	−2.74	−3.18, −2.31	< 0.001	
Place of residence (Brussels/not)	−0.53	−0.98, −0.09	0.02	0.06
2. Age				
Gender				
Place of residence (Brussels/not)				
Perceived threat	.94	1.77–2.10	< 0.001	0.23

that perception of threat, rather than real risk, is the most important predictor of self-reported health problems and that people perceiving high threat are therefore a vulnerable group for reporting and possibly even for developing certain health problems (Blackburn & Epel, 2012; Heir et al., 2016; Nissen et al., 2015).

The most prevalent problems reported by people who felt highly threatened were anxiety and stress-related mental health problems, lack of energy and sleeping problems. These problems were also found in studies conducted after other terroristic attacks. However, the most pronounced differences were related to some less prevalent but more alarming health problems: fainting spells, chest pain and shortness of breath. This poses the question of whether such health problems might be related to a rise in myocardial infarctions shortly after terroristic attacks in high-risk individuals, as reported in other studies (Goldberg et al., 2005; Qureshi et al., 2003).

The finding that women are more prone to threat and its effect is well known (Schuster et al., 2001; Stein et al., 2004). People working or living in the region of the attacks felt more threatened, which is in line with most other studies (Hansen et al., 2013). However, some studies only found a weak association between perceived threat and level of exposure (Bleich et al., 2003; Cohen et al., 2006).

The finding that middle-aged people feel more threatened than other age groups is consistent with a study by Chen et al. (2003) after the attacks in the US on 9/11. A possible explanation might be that feelings of threat in this age group may be extended to their close significant others. Hence, subsidiary feelings of threat, especially with regard to one's children, might augment one's perception of threat (Mawson, 2005).

Muslims reported the highest levels of threat. Although they were only a very small subgroup in our study, this finding is in line with other studies after terrorist attacks (Rubin et al., 2005; Schuster et al., 2001; Stein et al., 2004). Studies in Israel showed that populations associated with the offenders do not suffer less than the populations that are the explicit target of terrorists (Bleich et al., 2003; Cohen & Eid, 2007). It is however remarkable that violence 'in the name of religion' affects religious people the most. An alternative explanation might be that these people felt more vulnerable because of their limited income or because of threat from the terrorist attacks and from being mistakenly affiliated with its origin (Rubin et al., 2005).

People who spend a lot of time viewing information about the terrorist threat reported significantly higher levels of perceived threat. We cannot derive from our data whether people who felt threatened sought out more information or whether the opposite was true: people felt more threatened because of seeing more information about the attacks.

Our findings suggest that terrorist attacks do not only result in victims directly affected by the explosions but that many others may experience subjective health problems. After all, this is one of the main aims of terrorism. It can be therefore hypothesized that the months preceding the attacks, during which Belgium was in a state of highest alert after the attacks in Paris in November 2015, could already have primed a negative impact on the population. Other studies also found that by anticipating disasters, peoples' fears can worsen existing symptoms

(Schuster et al., 2001) and that an on-going perceived threat may engender health problems (Heir et al., 2016; Nissen et al., 2015).

Our study reports on subjective health specifically one week after the attacks and cannot make predictions about how this will evolve in the future. Many people are resilient and recover soon after such events (DiMaggio & Galea, 2006). However, a study by Stein et al. (2004) after the 9/11 attacks found that a significant number of adults continued to experience terrorism-related distress and disruption of their daily lives two months after the attacks (Stein et al., 2004). In a longitudinal study among police responders enrolled in the World Trade Center Health Registry, the prevalence of PTSD doubled between 2003–2004 and 2006–2007, suggesting that certain responses may even worsen with time (Bowler et al., 2012).

Three-quarters of the people who felt threatened reported at least a moderate level of mental or physical health problems. Longitudinal studies are needed to investigate if these subjective health problems will abate spontaneously or persevere and might require treatment by a professional caregiver. Self-administrated scales have been suggested as an efficient method for stratifying people into screen-positive and screen-negative groups, and might therefore be helpful by allowing clinicians to prioritize their limited time in favour of a smaller group with high scores (Kroenke et al., 2010). However, no systematic attempts have been made to identify populations at risk early after the attacks (Gruebner et al., 2016).

Our finding that 'feeling threatened' might serve as a red flag for people being at higher risk of developing health problems and might lead to the development of a practical tool for detecting people who might need greater attention by caregivers. However, the sensitivity and specificity of such a one-item measure might be low and probably more elaborate computerized questionnaires are required for prediction and follow-up of people at risk of developing health problems after traumatic events like terrorist attacks (Bourla, Mouchabac, El Hage, & Ferreri, 2018). Web-based intervention of this kind may be a useful tool to reach people with stress-related health problems and to conduct a first kind of 'automatic' triage by guiding them through a step-by-step process resulting in personalized advice such as to contact a suggested health care service or an invitation for another assessment of health problems after some time. This is especially useful because other studies have shown that a substantial number of people with high levels of symptoms do not seek professional care, and thus might develop problems that remain under the radar (Chang et al., 2017; Dyb, Jensen, Glad, Nygaard, & Thoresen, 2014)). It has also been shown that self-reported symptoms are highly associated with clinician-rated somatoform disorder symptom counts and that high scores are strongly associated with worsening function, increased disability days and health care utilization (Kroenke et al., 2010).

In addition to this, policymakers and caregivers should be prepared to deal with an increase in health problems in the days after the attacks, mainly for stress-related problems (Vandentorren, Paty, Baffert, Chansard, & Caserio-Schönemann, 2016). Especially for people with pre-existing problems, the terrorist threat might be a trigger causing severe problems such as major depression (Neria et al., 2013) and cardiac problems, including myocardial infarction (Goldberg et al., 2005; Qureshi et al., 2003).

The finding that certain populations are particularly vulnerable and that they may present typical health problems is also a reason to be prepared for providing adequate care tailored to the high-risk groups (Neria et al., 2013). Syndromic surveillance might be a useful measure for early detection at population level and to monitor the effects of terrorist attacks over time (Vandentorren et al., 2016). In addition, prevention strategies are needed that should be applied to all at risk, including those not yet showing PTSD symptoms shortly after the traumatic events.

Furthermore, not only survivors of terrorist attacks and their relatives are confronted with major stressors. Pre-hospital responders and health care services workers in general are professionally exposed to traumatic events. This is also the case for those providing psychosocial support to survivors and other people affected. Here too, the psychological problems are often underestimated (Bowler et al., 2012).

Further research is needed to check if physical health problems, such as fainting spells and chest pain, may be engendered by terroristic attacks in people who felt threatened. Longitudinal research is also needed to address the evolution of terrorism-related health problems and to shed light on cause–effect relationships, the role of religion and other factors, and the best ways to deal with (future) terrorist threats, should they happen.

5. Conclusion

In a self-selected sample of respondents, 'feeling threatened' was strongly associated with a lower level of subjective health. The most prevalent symptoms were mental health problems but the most pronounced differences between people with low

versus high levels of perceived threat were physical health problems.

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