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Generating physical symptoms from visual cues: an experimental study

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Generating symptoms

Abstract

This experimental study explored whether the physical symptoms of cold, pain and itchiness could be generated by visual cues, whether they varied in the ease with which they could be generated and whether they were related to negative affect. Participants were randomly allocated by group to watch one of three videos relating to cold (eg. ice, snow, wind), pain (eg. sporting injuries, tattoos) or itchiness (eg. head lice, scratching). They then rated their self reported symptoms of cold, pain and itchiness as well as their negative affect (depression and anxiety). The researcher recorded their observed behaviour relating to these symptoms. The results showed that the interventions were successful and that all three symptoms could be generated by the visual cues in terms of both self report and observed behaviour. In addition, the pain video generated higher levels of anxiety and depression than the other two videos. Further, the degree of itchiness was related to the degree of anxiety. This symptom onset process also showed variability between symptoms with self reported cold symptoms being greater than either pain or itchy symptoms. The results show that physical symptoms can be generated by visual cues indicating that psychological factors are not only involved in symptom perception but also in symptom onset.

Key words: symptom onset, perceptions, pain, cold, itch.

Introduction

From a medical perspective, symptoms such as a headache, tiredness or stomach pain may indicate the possibility of an underlying disease. Psychological research indicates, however, that symptoms are not simply a sensation but a perception relating to a range of factors including mood, cognitions and an individual's social context (Pennebaker, 1982; 1999). In terms of mood, much research indicates an association between negative affect and symptom reporting. For example, research indicates a link between stress and symptom reporting (Cropley and Steptoe, 2005; Wright et al. 2005) and a meta-analytic review of 244 observational studies of irritable bowel syndrome, non ulcer dyspepsia, fibromyalgia, and chronic fatigue syndrome reported a consistent impact of depression and anxiety on symptom perception (Henningsen et al. 2003) with parallel results also being reported for children and adolescents for stomach pain, headache, and leg pain (Eminson, 2007). Similarly the perception of migraines, pelvic pain and back pain has been shown to relate to anxiety (Feuerstein et al, 1987; McGowan et al, 1998). An individual's cognitions have also been shown to influence symptoms. Pennebaker (1982) proposed that symptom perception is directly influenced by the competition for an individual's attention between internal sensory and external environmental cues.

Therefore whereas external environmental cues can divert attention away from internal physical symptoms, a tedious task enables the individual to become more internally focused. In line with this, Pennebaker (1980) found that individuals cough more in boring situations than they do in stimulating ones. Similarly, research indicates that both distraction and low anxiety can reduce experimentally induced pain (James and Harardottir, 2002) and Eiser (2000) found that symptom perception can be influenced by

the way focus and attention are directed. Further, catastrophising cognitions, attention and fear have also been shown to predict the transition from acute to chronic pain and to exacerbate its perception (Linton et al, 2000; Sullivan et al, 2000). In addition, Stegen et al (2000) explored the impact of expectations on individual's perception of low intensity somatic sensations induced by breathing air high in carbon dioxide. The results showed that symptoms were rated as more unpleasant if participants expected them to be so.

An additional, and less researched factor which has shown to impact upon symptom perception is an individual's social context. For example, epidemiological studies indicate cultural differences in the reporting of physical symptoms suggesting a role for contextual factors. For example, whilst headache is a common symptom in the US and Western Europe its prevalence remains much lower in China and in African and Asian populations (eg. Wang et al, 1997; Ziegler, 1990; Stewart et al, 1996). Similarly, large surveys of primary care attenders report that those from less developed countries and from Latin America tend to report more somatic symptoms in general (Piccinelli and Simon, 1997; Gureje et al, 1997). One study explored cataract patients' reports of visual function and showed that after controlling for clinical and sociodemographic characteristics, patients from Canada and Barcelona reported less trouble with their vision than patients from Denmark or the US (Alonso et al, 1998).

From this perspective, symptoms are seen as a perception rather than a sensation and psychological factors are conceptualised as moderating the intensity of the symptom

experience. It is assumed therefore that there is an underlying factor which is translated into a greater or lesser symptom experience through a prism of psychological mechanisms. This model of symptom perception, whilst challenging a more medical model of symptom sensation, does not, however, explain why symptoms occur in the first place (Ogden, 2007). Therefore although psychological factors such as mood, cognition and social context are considered to exacerbate or ameliorate the perception of the symptom, the origins of that symptom (or symptom onset) remains unexplored. Do symptoms require this underlying factor or can they be generated without it? Can symptoms be completely psychogenic? This model does not, therefore, explain symptom onset.

To date, only a few studies have addressed the issue of symptom onset. Pennebaker (1982) reported that people were more likely to start scratching if they sat next to a confederate who was also scratching and Mechanic (1962) described ‘medical students’ disease’ and reported that the majority of medical students describe having some of the symptoms that they study. This suggests that seeing a symptom may help to generate that symptom elsewhere. In a similar vein, research also indicates that both smiling and yawning can be contagious (Wild et al. 2003; Schurman et al. 2005; Platek et al., 2005).

Research therefore suggests that symptom perception is influenced by a number of psychological factors including mood, cognitions and social context. Research also points to a role for psychological factors in the process of symptom onset. Central to some of this research is a role for visual cues in generating symptoms with such visual

cues playing a part in the individual's social context. In line with this, the present study explored the role of social context in symptom onset. In particular, the study assessed whether the physical symptoms of cold, pain and itchiness could be generated by visual cues. Further it also explored whether these symptoms vary in the ease with which they can be generated and whether negative emotion not only has a role to play in symptom perception but also in symptom onset.

Method

Design

The present study used an experimental design with three conditions involving three videos relating to cold, pain and itchiness. The dependent variables were three physical symptoms (cold, pain, itchiness) and negative emotion. Ratings of symptoms were recorded after the intervention only. A repeated measures design was not used to avoid priming effects. Therefore no baseline measures of symptoms or mood were taken as it is possible that reading a symptom checklist could itself generate symptoms and elicit mood (Ogden, 2003). Therefore each condition acted as the control for the other conditions.

Participants

Participants were recruited through a University and 6th form college. The study took place in Surrey in the UK and participants were asked to take part in the study at the end of their lecture. Ten participants declined to take part due to time constraints. The remaining participants (n=152) ranged in age from 19-56 yrs (mean = 27.2 yrs) and consisted of 43 males and 109 females.

Procedure

Six possible groups of participants were identified and randomly allocated by group to be exposed to one of the three videos. This resulted in two groups each being exposed to one video. At the end of their lecture participants were asked if they would like to take part in a study that would involve watching a short video film. They were then given a questionnaire which was placed face down on the table to avoid any priming effects. After watching the video they were then asked to complete the questionnaire.

The interventions

Participants watched one of three five minute video films which were designed to generate one of the three physical symptoms: cold, pain or itchiness. The video films were created from clips taken from www.youtube.com which consists of public videos which were edited together using Microsoft Windows Movie Maker. The three films contained images only without sound and were shown on a projector via a laptop computer. The films contained the following information:

Cold: This consisted of clips of snow, ice and wind, and pictures of people running in the snow and dipping into icy water.

Pain: This consisted of clips of people experiencing pain in a number of different situations including sporting injuries (football, boxing) and having tattoos.

Itchiness: This consisted of clips of head lice moving across strands of hair and examples of people itching their heads.

All clips were selected to provide a range of distance and close up shots and to show both the person's facial expression and the situation in which the person could feel the symptom.

Measures

Symptom measurement involved both self report and a behavioural observation.

1. Self report

Symptoms and emotions: Immediately after the video participants were asked to rate their physical symptoms and negative emotions 'right now' using a 5 point likert scale ranging from 'not at all' (1) to 'very much' (5). Each construct was assessed using three items. The reliability of these items was assessed using Cronbach's alpha:

Cold: (3 items: cold, shivery, chilly: $\alpha=0.94$).

Pain: (3 items: pain, aching/ sore, that your body hurts: $\alpha=0.97$).

Itch: (3 items: itchy, scratchy, tingling: $\alpha=0.91$).

Anxiety: (anxious, tense, nervous: $\alpha=0.89$).

Depression: (sad, depressed, miserable: $\alpha=0.92$).

The pain items were taken from the McGill Pain Questionnaire (Melzack, 1975) and the anxiety and depression items were taken from the Profile of Mood States (McNair, Lorr and Dropplemann, 1987).

Past experience: Participants rated how often they had ever experienced cold (cold, shivery or chilly), pain (broken limb, headaches or pain) and itchiness (head lice, itchy skin or eczema) on a scale ranging from 'not at all' (1) to 'very often' (5). These items

were summated to create three scales to reflect experience of pain, itchiness and cold which were recoded as 'No' (1/2), 'somewhat' (3) and 'yes' (4/5) for descriptive purposes.

Participants also described their age, gender, ethnic group and highest level of education.

2. Behavioural observation

Each group consisted of a maximum of 25 participants. The researcher drew an outline of where the participants were seated, gave them a number to match up with the questionnaire and observed the participants' reactions during the video. Each participant then received a code to indicate whether they showed the behaviour relating to each of the symptoms: cold was indicated by shivering; pain was deemed to be related to wincing and / or rubbing a limb; itchiness was indicated by scratching. This was a dichotomous variable (yes / no) and was rated by the same researcher each time.

Results

The results were analysed to describe participants' demographics and to assess differences in demographics between the three conditions using ANOVA and chi-square. The results were then assessed to examine the impact of condition on symptoms and emotion using ANCOVA and chi square, to assess whether the interventions were differentially effective at generating symptoms and whether the degree of symptom generation was related to negative affect.

i) Participant demographics

Participants' demographics are shown in Table 1.

-insert table 1 about here -

The sample consisted of 152 participants (females n=109; males n=43) who ranged in age from 19 to 56 (mean=27.2 years). The majority of participants was white and had studied up to degree level. Numbers of participants in the three conditions were equal. The results indicated that the majority of participants had not experienced head lice, itchy skin or eczema in the past and had not experienced a damaged limb, headaches or pain. However, the numbers were divided in terms of experiencing cold, shivers or chills.

ii) Demographics by condition

Differences in demographics by condition are shown in Table 2.

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The results showed a main effect of condition for age, sex and education. No differences were found for ethnicity. The results showed that the pain group was older and more educated than the other two groups whereas the itchy group consisted of proportionally more women. These demographics were therefore used as covariates in all subsequent analyses.

iii) The impact of the intervention.

The impact of the intervention is shown in table 3.

-insert table 3 about here -

The results were analysed to assess the impact of the intervention on physical symptoms and mood using ANCOVA with age, sex, and education as covariates for self reported symptoms and chi square for observed behaviour. The results showed that there was a significant main effect of condition on all dependant variables. In terms of self reported symptoms post hoc tests showed that those exposed to the cold video reported more cold related symptoms than the other two groups (itchy, pain), those exposed to the itchy video reported more itchy symptoms than the other two groups (pain, cold) and those exposed to the pain video reported more pain and more depression and anxiety than the other two groups (cold, itchy). In terms of observed behaviour, those in the cold group shivered more, those in the pain group winced more and those in the itchy group scratched more.

iv)The relative impact of the interventions

The results were then analysed to assess whether some symptoms were easier to generate than others using ANCOVA with age, sex and education as covariates. The results showed a significant difference between the 3 groups for the extent that the visual stimulus could generate the symptom relating to each video as measured by self report with cold symptoms being more easily generated than either pain or itchiness ($F=3.6$, $p=0.03$). No significant differences were found for observed behaviour ($X^2=1.13$, $p=0.57$).

v) The relationship between symptom onset and mood.

Finally the data was analysed to assess the relationship between anxiety and depression and the degree of symptom perception within each condition. For those seeing the cold video the results showed no significant correlations between the degree of cold experienced and either anxiety ($r=0.02$, $p=0.4$) or depression ($r=-0.06$, $p=0.4$). For those seeing the pain video the results showed no correlations between the degree of pain experienced and either anxiety ($r=-0.14$, $p=0.17$) or depression ($r=-0.03$, $p=0.42$). For those seeing the itchy video the results showed a significant positive correlation between the degree of itchiness and anxiety ($r=0.27$, $p=0.02$) but not for depression ($r=0.08$, $p=0.3$).

Discussion

The present study aimed to explore whether visual cues could generate symptoms, whether certain symptoms were easier to generate than others and whether symptom onset was related to negative affect.

Overall, the results indicate that the three interventions were successful and that the symptoms of cold, pain and itchiness were generated by their video both in terms of self reported symptoms and observed behaviour. Previous research indicates that symptom perception is influenced by a number of psychological factors including mood, cognition and aspects of the individual's social context (eg. Wright et al, 2005; James and Hardottir, 2002). One aspect of the social context is a visual cue to the presence or absence of symptoms. The results from the present study suggest that not only do such factors influence symptom perception but also symptom onset. This supports early work

that indicated that scratching can be passed from one person to the next (Pennebaker, 1982). It also finds reflection in research that indicates that smiling and yawning are contagious (Wild et al, 2001, Schurman et al, 2005; Platek et al, 2005). The focus on symptom perception to date has tended to assume that there is an underlying factor or sensation which is modified by perception. The results from the present study indicate that psychological factors may not only modify the symptom experience but also create it.

This process of symptom onset, however, was not equal across symptoms with self reported cold symptoms being generated to a greater extent than either pain or itchy symptoms. This may simply be an artifact of the effectiveness of the videos used indicating that the cold related visual cue was more explicit than the images illustrating pain or itchiness. It may, however, indicate that the onset of some physical symptoms is more influenced by psychological factors. Further research is needed to explore this variability to explain why certain symptoms may be more psychogenic than others.

Finally, the study also aimed to explore the relationship between symptom onset and negative emotion. The results indicated that exposure to the pain video resulted in an increase in both anxiety and depression. Furthermore, there was also an association between degree of itchiness and degree of anxiety generated by the itchy video. This association provides support for previous research which has consistently illustrated a link between emotion and symptom perception (Henningsen et al. 2003; Eminson, 2007; Feuerstein et al, 1987; McGowan et al, 1998). However, the results indicate that this link

is not universal and that some physical symptoms may be more related to negative emotions than others.

There are, however, some problems with the present study that need to be considered.

First, the study was carried out at one University in UK and the sample was students which limits the generalisability of the study. Second, although every effort was made to match the three videos in terms of the degree of facial expression versus situational shots and the range of the shots from close up to distance, the films varied in ways other than just the variables being assessed. Such variation was necessary given that the films needed to depict different symptoms which required different images. However, it also introduces an element of possible bias into the study. Third, no baseline measures of either symptoms or mood were taken. This was to avoid the possibility of priming effects as it has been argued that completing questionnaires can generate the constructs that they are designed to measure (Ogden, 2003). This design, however, also meant that no assessment of change was taken. Finally, the behavioural observation was made by one researcher. This approach limited the possibility of disagreement and / or variation across conditions but meant that only simple dichotomous measurements could be taken. Given these problems, however, the present study provides some preliminary insights into the impact of visual cues on physical symptom onset.

To conclude, the results from the present study indicate that the physical symptoms of cold, pain and itchiness can be generated by visual cues indicating that psychological factors are involved not only in symptom perception but also symptom onset. The results

however, show variability in this onset process with cold symptoms being easier to generate than those relating to either pain or itchiness. Furthermore, the results indicate that the association between negative emotion and physical symptoms reported in previous research may not be as consistent as often assumed. From a psychological perspective it is now accepted that symptoms are a perception rather than a sensation (Pennebaker, 1982, 1999). The results from the present study suggest that symptom onset is also related to psychological factors. Further research could explore the generation of symptoms from an integrated perspective with a focus on psychological, neurological and social perspectives. In addition, further research is needed to explore the extent to which the contribution of psychological factors varies between different physical symptoms and to assess the characteristics of those symptoms more or less open to psychogenic onset.

References

- Alonso, J., Black, C., Norregaard, J.C., Dunn, E., Andersen, T.F., Esallargues, M., Bernth-Petersen, P., Andersen, G.F. (1998). Cross cultural differences in the reporting of global functional capacity: an example in cataract patients. *Medical Care*, 36, 868-78.
- Cropley, M., & Steptoe, A. (2005). Social support, life events and physical symptoms: A prospective study of chronic and recent life stress in men and women. *Psychology, Health & Medicine*, 10 (4), 317-325.
- Eminson, D. M. (2007). Medically unexplained symptoms in children and adolescents *Clinical Psychology Review*, 27: 855-871.
- Eiser, J.R. (2000). The influence of question framing on symptom report and perceived health status, *Psychology and Health*, 15: 13–20.
- Feuerstein, M., Carter, R.L. and Papciak, A.S. (1987). A prospective analysis of stress and fatigue in recurrent low back pain, *Pain*, 31: 333–44.
- Gureje, O., Simon, G.E., Ustun, T.B and Goldberg, D.P. (1987). Somatisation in cross cultural perspective: a World Health Organisation study in primary care. *American Journal of Psychiatry*, 154; 989-995.
- Henningsen, P., Zimmerman, T. and Sattel, H.(2003). Medically unexplained physical symptoms, anxiety, and depression: A meta-analytic review. *Psychosomatic Medicine*, 65: 528-533.
- James, J.E. and Hardardottir, D. (2002). Influence of attention focus and trait anxiety on tolerance of acute pain, *British Journal of Health Psychology*, 7: 149–62.
- Linton, S.J., Buer, N., Vlaeyen, J. and Hellising, A. (2000) Are fear-avoidance beliefs related to the inception of an episode of back pain? A prospective study. *Psychology and Health*, 14, 1051-1059.
- McGowan, L.P.A., Clarke-Carter, D.D. and Pitts, M.K. (1998) Chronic pelvic pain: A meta-analytic review, *Psychology and Health*, 13: 937–51.
- McNair, D., Lorr, M., and Droppleman, L. *Manual for the Profile of Mood States*. San Diego: Educational and Industrial Testing Service. 1987.
- Melzack, R. (1975). The McGill Pain Questionnaire: major properties and scoring methods. *Pain*, 1, 277-299.
- Mechanic, D. (1962) *Students under Stress: A study in the Social Psychology of Adaptation*. Glencoe, IL: Free Press of Glencoe.

Ogden, J. (2007). Symptom onset and the socially sanctioned pathway: the example of diet. *Health: An international Journal*, 11(1): 7-27.

Ogden, J. (2003). Some problems with social cognition models: a pragmatic and conceptual analysis. *Health Psychology*, 22: 424-8.

Pennebaker, J. W. (1982). *The Psychology of Physical Symptoms*. New York: Springer-Verlag.

Pennebaker, J.W. (1999). Psychological Factors Influencing the Reporting of Physical Symptoms, in Stone, A.A., Turkkan, J.S., Bachrach, C.A., Jobe, J.B., Kurtzman, H.S. and Cain, V.S. (eds) *The Science of Self-Report, Implications for Research and Practice*, New Jersey: Lawrence Erlbaum Associates.

Pennebaker, J.W. (1980). Perceptual and environmental determinants of coughing. *Basic and Applied Social Psychology*, 1: 83-91.

Piccinelli, M. and Simon, G. (1997). Gender and cross-cultural differences in somatic symptoms associated with emotional distress. An international study in primary care. *Psychological Medicine*, 27: 433-444.

Platek, S.M., Mohamed, F.B. and Gallup Jr., G.G. (2005). Contagious yawning and the brain. *Cognitive Brain Research*, 23: 448-452.

Schurman, M., Hesse, M.D., Stephan, K.E., Saarela, M., Zilles, K., Hari, R. and Fink, G.R. (2005). Yearning to yawn: the neural basis of contagious yawning. *Neuro Image*, 24: 1260-1264.

Stegen, K., Van Diest, I., Van De Woestijne, K.P. and Van Den Berch, O. (2000). Negative affectivity and bodily sensations induced by 5.5% CO₂ enriched air inhalation: is there a bias to interpret bodily sensations negatively in persons with negative affect? *Psychology and Health*, 15, 513-525.

Stewart, WF., Lipton, RB., and Liberman, J. (1996). Variation in migraine prevalence by race. *Neurology*, 47, 52-9.

Sullivan, MJL., Thorn, B., Haythornthwaite, JA et al. (2001). Theoretical perspectives on the relation between catastrophising and pain. *Clinical Journal of Pain*. 17; 53-61.

Wang SJ, Liu HC, Fuh JL, Liu CY, Lin KP, Chen HM, Lin CH, Wang PN, Hsu LC, Wang HC, Lin KN. (1997). Prevalence of headaches in a Chinese elderly population in Kinmen: age and gender effect and cross-cultural comparisons. *Neurology*. 49:195-200.

Wild, B., Erb, M. and Batels, M. (2001). Are emotions contagious? Evoked emotions while viewing emotionally expressive faces: quality, quantity, time course and gender differences. *Psychiatry Research* 102: 109-124.

Wright, C. E., Ebrecht, M., Mitchell, R. Anggiansah, A., & Weinman, J. (2005). The effect of psychological stress on symptom severity and perception in patients with gastro-oesophageal reflux. *Journal of Psychosomatic Research*, 59, 415-424.

Ziegler DK (1990). Headache. Public health problem *Neurol Clin* 8:781-91.

Table 1: Participants' demographics

Variable	
Age	Mean=27.2 yrs SD=9.32 Range 19-56
Gender	Male=43 (28.3%) Female=109 (71.7%)
Ethnicity	White=141 (92.8%) Black=5 (3.3%) Asian=6 (3.9%)
Education	A-level=31 (20.4%) Degree=93 (61.2%) Postgraduate=25 (16.4%) PhD=3 (2%)
Group	Cold=48 (31.6%) Pain=49 (32.2%) Itch=55 (36.2%)
Ever been cold, had shivers or a chill?	No=55 (36.2%) Somewhat=54 (35.5%) Yes=43 (28.3%)
Ever broken a limb, had headaches, pain?	No=93 (61.2%) Somewhat=51 (33.6%) Yes=8 (5.2%)
Ever had lice, itchy skin or eczema?	No=123 (80.9%) Somewhat=27 (17.8%) Yes=2 (1.3%)

Table 2: Differences in demographics by condition

Variable	Cold (n=48)	Pain (n=49)	Itch (n=55)	F/ χ^2	P
Age*	Mean=23.21 SD=1.29	Mean=36.94 SD= 10.49	Mean=22.09 SD=4.13	F=81.17	p=0.0001
Sex*	Male=18 Female=30	Male=16 Female=33	Male=9 Female=46	$\chi^2=6.3$	p=0.04
Ethnicity	White=46 Other=2	White=47 Other=2	White=48 Other=7	$\chi^2=3.87$	p=0.144
Education*	Degree=47 >Degree=1	Degree=26 >Degree=23	Degree=54 >Degree=1	$\chi^2=57.7$	p=0.0001

***Significant effect of condition**

Table 3: The impact of the intervention

Variable	Cold (1) (n=48)	Pain (2) (n=49)	Itch (3) (n=55)	F/p	Post hoc (by group no.)
Self report					
Cold*	Mean=3.23 SD=1.25	Mean=1.69 SD=0.89	Mean=1.25 SD=0.65	F=59.73 p=0.0001	1>2,3
Pain*	Mean=1.15 SD=0.45	Mean=3.08 SD=1.24	Mean=1.11 SD=0.35	F=19.54 p=0.0001	2>1,3
Itchiness*	Mean=1.15 SD=0.41	Mean=1.63 SD=1.04	Mean=2.81 SD=1.07	F=49.21 p=0.0001	3>2,1
Depression*	Mean=1.32 SD=0.59	Mean=1.55 SD=1.04	Mean=1.16 SD=0.40	F=6.25 p=0.002	2>1,3
Anxiety*	Mean=1.40 SD=0.62	Mean=2.15 SD=1.26	Mean=1.39 SD=0.56	F=10.49 p=0.0001	2>1,3
Behavior					
Cold*	N=25 Y=23	N=49 Y=0	N=55 Y=0	X ² =58.7 p=0.0001	1>2,3
Pain*	N=48 Y=0	N=22 Y=27	N=55 Y=0	x ² =69.0 p=0.0001	2>1,3
Itch*	N=46 Y=2	N=47 Y=2	N=23 Y=32	x ² =56.7 p=0.0001	3>2,1

*significant effect of condition