Trypophobia: An investigation of clinical features

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1. Chapter 1: Introduction and literature review

INTRODUCTION, BACKGROUND AND SIGNIFICANCE

Trypophobia refers to a pathological fear of, or aversion to, clusters of concave objects (holes) or things reminiscent of clusters of holes. Researchers have recently suggested that the term should also encompass fear of/ aversion to, clusters of convex objects (bumps).

Individuals with Trypophobia report a phobic response to a wide range of stimuli, from the visual markings of poisonous fish to seemingly innocuous images such as that of water condensation, beehives, sea sponges and seedpods. The term was coined as recently as 2005, from the Greek trýpa which means "hole" and phóbos indicating "fear".

On the one hand, this set of symptoms would seem to be an unusual one, perhaps rarely encountered by the clinician. However, with the emergence of the Internet and virtual support groups, it turns out that this may be a not uncommon phenomenon.
There are a number of Internet-based support groups, including a social media site (https://www.facebook.com/groups/3318322299/), where more than 11 000 people with Trypophobia provide testimonials and a sharing of experience. Individuals describe these images as haunting, evoking fear, panic attacks, revulsion, distress and a wide variey of somatic symptoms such as nausea and itchiness. It is clear from their accounts that for many people, Trypophobia affects their everyday lives and can be quite debilitating.
From a clinical standpoint, this support group appears to play an important role for many of its members. For those with an unusual disorder or a disorder that is rarely talked about, the anonymity and geographical breadth of the Internet may present the only opportunity to share information and support with others who have the same problem.
Trypophobia has, however, not yet been well characterized and is to date largely unreported in scientific literature. Questions remain about the socio-demographic factors correlates and phenomenological features, such as symptom severity, course, duration, comorbidities, levels of psychological distress and impairment. One question is whether it shows more resemblance to a specific phobia or to obsessive compulsive and related disorders.

RESEARCH AIM

This is an exploratory study that aims to document and capture a phenomenon that has to date been largely unreported in scientific literature, yet that thousands of individuals suffer from.

The aim of this study is to investigate the socio-demographic correlates and phenomenology – symptom severity, course, duration, comorbidities, levels of psychological distress and impairment – of Trypophobia; this by conducting an Internet survey on individuals with self-reported Trypophobia.

Another aim is to better characterize Trypophobia as a possible subtype of specific phobia or obsessive-compulsive disorder according to DSM-5 criteria.

The study will also try to determine whether Trypophobia is a phenomenon with clinical significance, and if so, to highlight the need for further research on etiology, pathogenesis and treatment. The main goal, however, is to advance health and scientific knowledge by efficiently gathering data that could inform future studies, and that could help Trypophobia to be officially recognized – this would for example entail recognition in the DSM as a subtype of specific phobia or obsessive-compulsive disorder. This would provide validation of sufferers experiences.

RESEARCH OBJECTIVES

Objective 1: To determine the socio-demographic correlates of self-reported Trypophobia.
Objective 2: To determine the symptom duration, course and severity of Trypophobia.
Objective 3: To better characterize Trypophobia as a possible subtype of specific phobia or obsessive-compulsive disorder according to DSM-5 criteria.
Objective 4: To screen for comorbid specific phobia or obsessive-compulsive disorder in a population with self-reported Trypophobia.
Objective 5: To determine the level of psychological distress in individuals with Trypophobia.

Objective 6: To determine the level of impairment in individuals with Trypophobia.

RESEARCH HYPOTHESES

It is hypothesized that the socio-demographic correlates and phenomenology – symptom severity, course, duration, comorbidities, levels of psychological distress and impairment – would be widely varied in a population with self-reported Trypophobia.

It is further hypothesized that Trypophobia would manifest in 2 different ways, i.e. as a specific phobia or as an obsessive compulsive related condition.

If fear and avoidance are prominent, and participants fulfill the DSM-5 criteria for specific phobia, Trypophobia could arguably be categorized in the Specific Phobia section of the DSM-5. It could then theoretically be viewed as a specific phobia (subtype: "Other").

However, if respondents report obsessions/ compulsions centering around aversion to configurations of holes, and the DSM-5 criteria for obsessions/ compulsions be fulfilled, DSM-5 categorization with Obsessive-Compulsive and Related Disorders would seem appropriate. However, it should be noted that in the latter case, the current name of the condition would then not be appropriate (i.e. it would then not be a "phobia"…).

LITERATURE REVIEW

A search of the literature was carried out to determine what previous studies have been undertaken to evaluate the phenomenon of Trypophobia. Three databases (Medline, Pubmed and Psychinfo) were searched, using various combinations of the key terms "fear," "phobia," "holes," "clusters," "anxiety," "obsessive," "compulsive," "internet," "survey," "online", "questionnaire", "ethics", "rating" and "scales".

Additional references were obtained from the bibliographies of the articles found.

Trypophobia – the phenomenon

Trypophobia is to date largely unreported in scientific literature, although it's documentation on the Internet surpasses that of several more widely recognized phobias. In the early 2000s many Internet users discovered a common aversion to pictures that showed clustered arrays of small holes, such as a beehive or even the popped bubbles on the uncooked top of a pancake. For almost a decade "trypophobia," literally "fear of holes," was nothing more than an Internet phenomenon, but finally researchers have found evidence of its validity and investigated its possible cause. With the growth of online image sharing many people realized they shared a revulsion that could reach the level of nausea to photographs of clusters of holes (Skaggs, 2014).

The term "trypophobia" appears to have been coined by an unidentified Irish woman in a post on a Web forum in 2005. The idea went viral: self-identified trypophobics formed a Facebook group, created an eponymous Internet domain and posted informational YouTube videos. A Wikipedia article was repeatedly created and repeatedly deleted for lack of reliable sources (Skaggs, 2014).

Geoff G. Cole and Arnold J. Wilkins, two researchers from the University of Essex in England and the first to scientifically investigate and publish on the phenomenon, describe Trypophobia as a condition where sufferers report fear of/ aversion to visual stimuli comprising particular configurations of holes. The stimuli are usually clusters of holes of any variety that are almost always innocuous and seemingly pose no threat. They showed an image of a lotus seed head (a potent trigger of Trypophobia) to 286 adults aged 18 to 55 years old. Eleven percent of men and 18 percent of women described the image as "uncomfortable or even repulsive to look at,"(Cole, Wilkins 2013).

Subsequently, An T. D. Le, Geoff G. Cole & Arnold J. Wilkins (2015) recently developed and validated a symptom scale that can be used to identify Trypophobia, in which individuals experience aversion induced by images of clusters of circular objects. The trypophobia questionnaire (TQ) was based on reports of various symptom types, but it nevertheless demonstrated a single construct, with high internal consistency and test–retest reliability. The TQ scores predicted discomfort from Trypophobic images, but not neutral or unpleasant images, and did not correlate with anxiety. Furthermore, it was found that clusters of concave objects (holes) did not induce significantly more discomfort than clusters of convex objects (bumps), suggesting that Typophobia involves images with particular spectral profile rather than clusters of holes per se (Le, Cole, Wilkins,

2015).

The seed head of the lotus flower

Etiological theory

Normal anxiety is an emotion that helps organisms defend against a wide variety of threats. There is a general capacity for normal defensive arousal, and subtypes of normal anxiety protect against particular kinds of threats (Marks, Nesse 1994).

Advances in our understanding of the anxiety disorders and in the application of evolutionary principles to medicine provide the possible basis for a neuro-evolutionary approach to these conditions. This approach suggests that particular anxiety disorders, as well as obsessive-compulsive and related disorders, are mediated by specific brain-based false alarms (Bateson, Nettle, Brilot 2011).

Factors that have shaped mechanisms of anxiety-regulation can explain prepared tendencies to associate anxiety more rapidly with certain cues than with others. These tendencies lead to excess fear of largely archaic dangers, like snakes, and too little fear of new threats, like cars. An understanding of the evolutionary origins, functions, and mechanisms of anxiety suggests new questions about anxiety disorders (Marks, Nesse 1994).

Sufferers of Trypophobia typically report that it is the visual quality of certain images that is particularly aversive. This aversion can be contrasted with, for instance, an aversion to cats, in which a person will be uncomfortable in the presence of a cat even if it is not visible. (Cole, Wilkins 2013).

For many years, researchers have been aware of aversion and discomfort caused by the viewing of certain geometrical patterns (Wilkins et al. 1984). It has also been suggested that the extent of discomfort caused by a wide variety of images is proportional to the energy at different spatial scales, as measured by the Fourier amplitude spectrum of the luminance. For example, striped patterns with spatial frequency within a specific range are known to be uncomfortable and are even capable of provoking headaches and seizures in susceptible persons (Fernandez, Wilkins 2008).

Any image can be analyzed with respect to its fundamental visual properties such as its brightness (luminance), spatial frequency, contrast, and chromatic properties (Cole, Wilkins 2013). Fernandez and Wilkins (2008) asked participants to rate discomfort in response to a wide variety of images, including paintings, photographs, and meaningless images created from random noise. It was found that images rated as being particularly uncomfortable to look at, and associated with aversion, possessed a specific midrange, high contrast spatial frequency and spectral composition (Cole, Wilkins 2013; O'Hare, Hibbard 2010). It was also found that non-Trypophobic individuals perceived Trypophobic images of holes to be more aversive to look at than non-Trypophobic images of holes. It suggests that Trypophobia is a matter of degree, an exaggeration of a normal tendency (Cole, Wilkins 2013).

Cole and Wilkins (2013) believe the reaction to be based on a biological revulsion or aversion, rather than a learned cultural fear. They have argued that the reaction (i.e. the revulsion) to the stimulus (i.e. the constellation of holes) is based on a brain response that associates the stimulus with danger, in other words they argue that this phenomenon can be explained from an evolutionary perspective. In 2013 they obtained images of animals that in a large number of Internet sources have been listed as "the 10 most poisonous". The 10 species were the blue-ringed octopus, the box jellyfish, the Brazilian wandering spider, the deathstalker scorpion, the inland taipan snake, the king cobra snake, the marbled cone snail, the poison dart frog, the puffer fish, and the stonefish.

Interestingly, the spectral composition of highly poisonous animals possesses similar features to that of Trypophobia-inducing images (Cole, Wilkins 2013).

It is therefore suggested that Trypophobia arises due to a reaction to the spectral features of some poisonous organisms—a feature that does not reach conscious awareness. In other words, if any stimulus, such as a configuration of holes, coincidently possesses this spectral feature, the stimulus may induce some form of fear or aversion because of the survival value of such an fear or aversion. In other words, some Tryptophobia-inducing images are often reminiscent of the shapes on the bodies of highly poisonous animals, evoking strong fear and avoidance in some humans (Cole, Wilkins 2013).

This survival account is based on the notion that humans have an intrinsic and instinctive ability to notice poisonous organisms. It supports the notion that phobias can be explained by an innate evolutionary predisposition to fear of potentially dangerous stimuli (Marks, Nesse, 1994).

Trypophobia – a specific phobia?

A key feature of the DSM-5 diagnostic criteria for specific phobia is that the fear or anxiety must be circumscribed to the presence of a particular situation or object, which may be termed the phobic stimulus (APA, 2013). In the case of Trypophobia it could be reasoned that clusters of holes or images of clusters of holes serve as the phobic stimulus.

Further more the fear response must differ from normal, transient fears that commonly occur in the population. It also involves active avoidance, implying that individuals suffering from a Specific Phobia intentionally behave in ways designed to prevent or minimize contact with the phobic object or situation. It is also typically associated with an increase in physiological arousal in anticipation of or during exposure to the phobic stimulus (APA, 2013).

The distinction between the presence of subclinical symptoms and a clinical disorder

requires assessment of a number of factors, including an individual's level of distress and impairment in functioning. In order to meet the DSM-5 criteria for specific phobia the fear, anxiety or avoidance has to cause clinically significant distress or impairment in social or occupational or other important areas of functioning, and has to last 6 months or more.

Does Trypophobia meet the DSM-5 diagnostic criteria for Specific Phobia? If fear and avoidance are prominent, and the distress and impairment criteria are met, then categorization as a specific phobia (subtype: "Other") would arguably be accurate.

Trypophobia – related to obsessive compulsive disorder?

In accordance to the DSM-5, obsessive compulsive disorder is characterized by the presence of obsessions and/or compulsions.

Obsessions are recurrent and persistent thoughts, urges or images that are experienced as intrusive, unwanted, often aversive and ego-dystonic (APA,2013). Theoretically, should an individual be unusually preoccupied with images/thoughts of clusters of holes, and it is found to be intrusive and ego-dystonic, Trypophobia could be seen as a type of obsession.

Compulsions are repetitive behaviors or mental acts that an individual feels driven to perform in response to obsessions, or according to rules that must be applied rigidly (APA,2013). Should Trypophobia lead to compulsive behaviors such as checking or reassurance-seeking that causes functional impairment, it could theoretically be viewed as compulsive behavior in response to obsessive thought content.

If the respondents report obsessions / compulsions centering around fear of/ aversion to particular configurations of holes, then categorization with Obsessive-Compulsive and Related Disorders in the DSM-5 would seem appropriate. However, it should be noted that in the latter case, the current name of the condition would then not be appropriate (i.e. it would then not be a "phobia"…).

The distinction between the presence of subclinical symptoms and a clinical disorder

requires assessment of a number of factors, including an individual's level of distress and impairment in functioning. Clinically significant obsessions or compulsions are time-consuming (e.g., take more than 1 hour per day) or cause severe distress or impairment in social, occupational or other important areas of functioning (APA, 2013).

The Validity of Internet-based research

Rapid and far-reaching technological advances are revolutionizing the ways in which people relate, communicate, and live their daily lives (Jerome et al, 2000). So too it is changing psychological research. New or rare phenomena can be observed online and research on traditional psychological topics can be done more efficiently, enabling investigators to expand the scale and scope of their research (Kraut et al, 2004). Extensive information can be gathered at no cost and with great efficiency (Lipsits et al, 2001).

Internet samples are shown to be relatively diverse with respect to gender, socioeconomic status, geographic region, and age. Moreover, Internet findings are not adversely affected by nonserious or repeat responders, and are consistent with findings from traditional methods (Gosling et al, 2004). The Internet has a clear sampling advantage for populations that are difficult to access because (1) the sample is difficult to bring to a laboratory, (2) the population is small, or (3) group members are difficult to find (Nosek, Banaji, 2002).

The advent of Internet-based self-help systems for common mental disorders has also generated a need for quick ways to triage would-be users to systems appropriate for their disorders. This need can be met by using brief online screening questionnaires, as it offers quick and easy access to large numbers of users at a low cost (Donker et al, 2009).

In a study to investigate the prevalence of Internet use for mental health information seeking, it was found that eighteen per cent of all Internet users had used the Internet for information related to mental health. The prevalence was higher among those with a past history of mental health problems and those with current psychological distress (Powell, Clarke, 2006).

Social networking sites (SNS) have become increasingly popular in recent years. With

the amount of data available on SNS, the potential exists for researchers to use these data for their research. However, like any research method, there are limitations in using data from SNS. First, as members of SNS are not representative of the population, there is the limitation in generalizing the findings to the population. Second, in SNS with a low level of activity, there is also the issue of whether the data are sufficient for analysis. Third, the validity of the postings by members of SNS should be considered, as members of SNS may not be truthful in their responses. In addition, as the environment for SNS favors a quick emotive response as opposed to a cognitive response, the review suggests that the researcher will need to be aware of possibly different behavior when members of a SNS are faced with a high involvement decision (Leng, 2013).
For example, in a study to validate the use of Internet administered questionnaires compared to paper-and-pencil versions in panic disorder, the administration format did in no case affect the internal consistency of the questionnaires (Carlbring et al, 2007). The correlations between the two administration formats were high, in line with test‑retest values of Internet questionnaires on the paper-and-pencil version. Both the Internet and the paper-and-pencil versions of all questionnaires had alpha values well above 0.70, which is considered good (Clark-Carter, 1997).

The above data therefore supports earlier studies suggesting that the alpha values of paper-and-pencil questionnaires can be replicated when administered via the Internet (Andersson et al., 2003; Buchanan, 2003). It is also supported by a more recent study investigating the validity of Internet-administered anxiety questionnaires as compared to their standard paper-and-pencil format. The overall findings showed that the two groups were very similar, and if a systematic bias in favor of one administration format had been present it is likely that the differences would have been larger (Hedman et al, 2010).

In an Italian study to explore the possible use of Internet tools in psychological research, Web-based assessment techniques were compared with traditional paper-based methods. The collected data were analyzed to identify both differences between the two samples and in the psychometric characteristics of the questionnaires. No relevant differences were found in the psychometric properties of the different questionnaires. This result was interesting given the seemingly lack of control of the characteristics of the online sample. These finding suggests that, if sampling control and validity assessment is provided, Internet-based questionnaires can be a suitable alternative to more traditional

paper-based measures (Riva et al, 2004).

The Ethics of Internet-based research

Internet communities (such as mailing lists, chat rooms, newsgroups, or discussion boards on websites) are rich sources of qualitative data for health researchers. Internet research is inherently no more risky than traditional observational, survey, or experimental methods. Yet the risks and safeguards against them will differ from those characterizing traditional research and will themselves change over time (Kraut et al, 2004).

Internet-based research raises several ethical questions, especially pertaining to privacy and informed consent. Researchers and institutional review boards must primarily consider whether research is intrusive and has potential for harm, whether the venue is perceived as “private” or “public” space, how confidentiality can be protected, and whether and how informed consent should be obtained (Eysenbach, Till, 2001).

The absence of an experimenter engaged in face-to-face interaction with the participant removes the most obvious source of coercion that has been a source of concern in psychological experimentation. The physical absence of a researcher in Internet study designs also eliminates the social demand to continue participation, thereby allowing participants greater freedom to withdraw at any stage. These are a important benefits of Interned based research. (Nosek et al, 2002).

The Internet holds various pitfalls for researchers, who can easily and unintentionally violate the privacy of individuals. For example, by quoting the exact words of a newsgroup participant, a researcher may breach the participant's confidentiality even if the researcher removes any personal information. This is because powerful search engines such as Google would be able to retrieve the original message by using the direct quote as a query. Participants should therefore always be approached to give their explicit consent to be quoted verbatim and should be made aware that their email address might be identifiable. Another reason why researchers should contact individuals before quoting them is that the author of the posting may not be seeking privacy but publicity, so that extensive quotes without attribution may be considered a misuse of another person's intellectual property (Eysenbach, Till, 2001).

Many experimental designs do not require identifying information from the participants. In this case, a number of factors indicate that Internet research can guarantee anonymity even more effectively than standard laboratory research (Nosek et al, 2002).

There are several options available to an Internet-researcher to enable debriefing after completion of a questionnaire. The provision of the researcher's e-mail address can offer participants an e-mail address to which to send their questions and concerns about the study. A list of frequently asked questions can also be provided. The researcher can be available in a chatroom following participation to interactively address concerns or answer questions. In this type of design, the study might be made available only when the researcher is online (Nosek et al, 2002).

Internet-based research designed to use children as participants should proceed with care similar to that in standard laboratory settings. A more difficult issue for Internet research is controlling participation in research not designed for children. Whereas the participation of an 8-year-old (even a 16-year-old) is not likely to pass unnoticed in a standard laboratory, "catching" such partici- pants on the Internet can be difficult. Asking participants to report their age may be sufficient to remove minors from data analysis, but it is not sufficient to prevent them from completing the study itself. There are, however, strategies available to minimize the opportunity and/or likelihood that children will participate. Design decisions for an experimental Web site should maximize its appeal to adults while simultaneously minimizing its appeal to children. This might be as simple as avoiding cartoons or popular-culture images that attract children or as involved as gearing the site description and text toward adults (Nosek et al, 2002).

METHODS

This is a descriptive, analytic study using survey methodology.

Sampling and procedure for sampling

An Internet based survey (Appendix A) will be administered to a social media support group for Trypophobia consisting of approximately 1000 active members, which would

comprise the total study population.

The support group is composed of individuals with self-reported fear of/ aversion to clusters of holes. Participants would be recruited by posting a link to the questionnaire on a social media platform, and anyone aged 18 or older with a self-reported fear of/ aversion to clusters of holes would be free to participate.

Whilst participant response rate is not predicable, a response rate of 10-40%, approximating that of most general surveys, is assumed. The expected sample size is therefore 100 to 400.

Inclusion Criteria: All individuals aged 18 years or older with a self-reported fear of/ aversion to clusters of holes or bumps.

Exclusion Criteria: All individuals under the age of 18 years.

Measures

The outcome measure used will be a self-administered online questionnaire powered by Surveymonkey (Appendix A).

There will be an inbuilt programmed electronic mechanism in the SurveyMonkey questionnaire prohibiting individuals from completing the questionnaire more than once.

The questionnaire will assess the socio-demographic correlates and phenomenology – symptom severity, course, duration, comorbidities, levels of psychological distress and impairment - in a population with self-reported Trypophobia.

There will also be sections based upon the DSM-5 diagnostic criteria for specific phobia and obsessive compulsive disorder. The Zohar-Fineberg Obsessive Compulsive Screen is a brief, validated screening tool that would be used to screen for comorbid obsessive compulsive disorder. This screening tool consists of five simple questions and takes less than 1 min to administer (Stein et al, 2012).

The Kessler Psychological Distress Scale (K10) would be utilized to measure psychological distress independent of diagnosis. This is a ten item consumer self-report measure intended to yield a global indication of distress based on questions about anxiety and depressive symptoms that a person has experienced in the most recent 4-week period.

The Sheehan Disability Scale is a three item self-rated scale of impairment. The items address the impact of symptomatology on three areas of functioning: work, social and family life (Leon et al, 1991). It would be used to measure impairment caused by symptoms related to Trypophobia.

The online questionnaire would be conducted exclusively in the English language and would take approximately 15-20 minutes to complete.

Data analysis

Data will be captured on Excel spreadsheets by the primary researcher.
Data analysis would be done with the help of the Department of Statistics of UCT.

Categorical variables would be analyzed by estimating proportions that fall into different categories. Visually one would look at histograms for continuous data and bar charts for categorical data.

Descriptive variable data will be expressed as means and standard deviations, or medians and ranges for non-parametric data.

The sub-questionnaires will be analyzed separately.

LIMITATIONS OF THE STUDY

This research would aim to study a mixed group of individuals with self-reported fear of clusters of holes/ images of clusters of holes. It would be difficult to draw conclusion from such a mixed sample. A homogeneous sample of individuals with Trypophobia is yet to

be studied systematically.

As participants are self-recruited on the Internet, there is no way to guarantee how representative they would be of the general (local/ international) population. The study findings results will therefore not be generalizable to other populations. A low response rate might also introduce a non-response sampling bias. However, the recruitment method might also be a strength of the study, as it has been argued that the Internet holds promise as a way to recruit more, rather than less, representative samples for research (Reips, 2000).

The validity of answers by members of social networking site (SNS) should also be considered, as members of SNS may not be truthful in their responses. In addition, as the environment for SNS favors a quick emotive response as opposed to a cognitive response, the researcher will need to be aware of possibly different behavior when members of a SNS are faced with a high involvement decision (Leng, 2013).

In the screen for comorbidities, participants would describe other current/ lifetime mental health problems. Since no clinical assessment would be conducted, these reports reflect participants' own understanding of their difficulties, which may or may not be based on diagnoses given by clinicians.

Another limitation of the study is the restriction of the study population to an Internet literate group, with Internet access. The method might therefore prevent individuals from lower socioeconomic circumstances without Internet access from participating.

The questionnaire would also exclusively be conducted in the English language - this might preclude participation from individuals not fluent in this language.

ETHICAL CONSIDERATIONS

Consent

An information sheet and consent form (Appendix B) would be included at the beginning at the questionnaire emphasizing that this is a research project and that participation is

fully optional. It would serve to invite participation of individuals 18 years of age or older, and would assure anonymity and confidentiality. It would explain that participants would be allowed to withdraw participation at any time during the questionnaire by closing the web browser, or after participation by sending an email to the primary investigator. An “agree to consent” or “disagree to consent” button at the beginning of the questionnaire would serve to qualify only those who voluntarily agree to consent to continue with the questionnaire.

The first question in the questionnaire would ask participants to state their age. Should an individual below the age of 18 try to participate, they would immediately be disqualified from completing the survey by a programmed electronic mechanism in SurveyMonkey. The questionnaire is designed as to maximize its appeal to adults while simultaneously minimizing its appeal to children. No cartoons or popular-culture images that might attract children are included in the questionnaire.

Should an individual not be willing to answer a specific question, he/she would be allowed to proceed to the next by clicking on the “next” button, which would be provided after each question.

Participation is voluntary and will not be remunerated. There may be no benefits to participants. There will be no costs to the participants.

Privacy

Subjects would not be required to disclose their name, address or any identifying data as to ensure privacy. The identity of the individual would not be recorded, linked or associated with the data obtained.

Confidentiality

All information obtained from participants will be kept strictly confidential, and all responses will be anonymously handled. Only the research team will have access to the survey data through the use of access privileges and passwords, and it will be stored in a secure database until deleted by the primary investigator upon completion of the study.

Protection against triggering of distress

No images that may trigger symptoms of Trypophobia would be included as part of the questionnaire. This would also be stated at the beginning of the questionnaire as part of the information sheet (Appendix A).

Participants would be advised to seek help from their local health care practitioner should they feel distressed by their symptoms. Further information on Trypophobia or other mental health care issues would be provided by the primary investigator at no cost if requested. The e-mail address of the primary investigator would be provided as part of the information sheet (Appendix A).

This is a low risk study posing no more than minimal risk to subjects. This proposal adheres to the declaration of Helsinki.

Approval will be sought from the University of Cape Town Faculty of Health Sciences Human Research Ethics Committee.

REFERENCES

American Psychiatric Association. 2013. Diagnostic and Statistical Manual of Mental Disorders, Fifth edition.

Andersson, G., Kaldo-sandstro, V., Stro, L., & Stro, T., 2003. Internet administration of the Hospital Anxiety and Depression Scale in a sample of tinnitus patients, Journal of Psychosomatic Research, 55(2003), pp. 259–262.

Bateson, M., Brilot, B. & Nettle, D. 2011. Anxiety: An Evolutionary Approach, Can J Psychiatry, 56(12), pp. 707–715.

Buchanan, T., 2003. Internet-based questionnaire assessment: appropriate use in clinical contexts, Cognitive Behaviour Therapy, 32 (2003), pp. 100‑109

Carlbring, P., Brunt, S., Bohman, S., Austin, D., Richards, J., Öst, L., Andersson, G., 2007. Internet vs. paper and pencil administration of questionnaires commonly used in panic/agoraphobia research, Computers in Human Behavior, 23(3), pp. 1421–1434.

Çavuşoğlu, M, Dirik G., 2011. Fear or disgust? The role of emotions in spider phobia and blood-injection-injury phobia, Turk Psikiyatri Derg. 22(2), pp. 115-22.

Clark-Carter, Hove, D., 1997. Doing quantitative psychological research: From design to report, Psychology Press/Erlbaum (UK) Taylor & Francis. (1997).

Cole, G. G., Wilkins, A. J., 2013, Fear of holes., Psychological Science, 24(10), pp. 1980–1985.

Coles, M., Cook, L., Blake, T. R., 2007, Assessing obsessive compulsive symptoms and cognitions on the internet: evidence for the comparability of paper and Internet administration, Behaviour Research and Therapy, 45(9), pp. 2232–2240.

Donker, T., Van Straten, A., Marks, I., & Cuijpers, P., 2009. A brief Web-based screening questionnaire for common mental disorders: development and validation. Journal of Medical Internet Research, 11(3).

Eysenbach, G., Till, J. E., 2001, Ethical issues in qualitative research on internet communities. British Medical Journal, 2001;323:1103.

Fernandez, D. Wilkens, A.J., 2008. Uncomfortable images in art and nature, Perception. 37(7), pp. 1098–1113.

Fineberg, N. A., Krishnaiah, R. B., Moberg, J., Doherty, C. O., 2008. Clinical Screening for Obsessive-Compulsive and Related Disorders, Israel Journal of Psychiatry and Related Sciences, 45(3), pp. 151–163.

Gosling, S. D., Vazire, S., Srivastava, S., John, O. P., 2004. Should we trust web-based studies? A comparative analysis of six preconceptions about internet questionnaires, The American Psychologist, 59(2), pp. 93–104.

Hare, L. O., Hibbard, P. B., 2011. Spatial frequency and visual discomfort. Vision Research, 51(15), pp.1767–1777.

Hedman, E., Ljótsson, B., Rück, C., Furmark, T., Carlbring, P., Lindefors, N., Andersson, G., 2010. Internet administration of self-report measures commonly used in research on social anxiety disorder: A psychometric evaluation, Computers in Human Behavior, 26(4), pp. 736–740.

Jerome LW, DeLeon PH, James LC, Folen R, Earles J, Gedney JJ., 2000. The coming of age of communications in psychological research and practice. Am Psychol 55:407–421

Kraut, R., Olson, J., Banaji, M., Bruckman, A., Cohen, J., Couper, M., 2004. Psychological Research Online: Report of Board of Scientific Affairs' Advisory Group on the Conduct of Research on the Internet, American Psychologist, 59(2), pp. 105–117.

Le, A. T. D., Cole, G. G., Wilkins, A. J., 2015. Assessment of trypophobia and an analysis of its visual precipitation, Quarterly journal of experimental psychology pp. 1–49.

Leng, H. K., 2013. Methodological issues in using data from social networking sites. Cyberpsychology, Behavior and Social Networking, 16(9), pp. 686–689.

Lipsitz, J. D., Fyer, A. J., Paterniti, A., Klein, D. F., 2001. Emetophobia: Preliminary results of an Internet Survey, 152(January), pp. 149–152.

Marks, I. M., Nesse, R. M., Arbor, A., 1994. Fear and Fitness: An Evolutionary Analysis of Anxiety Disorders, Ethology and Sociobiology, 15(5-6), pp. 247-261.

Nosek, B. A., Banaji, M. R., 2002. E-Research: Ethics, Security, Design, and Control in Psychological Research on the Internet, Journal of Social Issues, 58(1), pp. 161-176

Powell, J., Clarke, A., 2006. Internet information-seeking in mental health: population survey, Royal College of Psychiatrists, British Journal of Psychiatry, 189, pp. 273-277.

Riva, G., Teruzzi, T., Anolli, L., 2003. The Use of the Internet in Psychological Research:

Comparison of Online and Offline Questionnaires, Cyberpsychology & Behavior: The Impact of the Internet, Multimedia and Virtual Reality on Behavior and Society, 6(1), pp 73–81.

Sheehan, D V.; Harnett-Sheehan, K.; Raj, B. A, 1996. The measurement of disability, International Clinical Psychopharmacology, 11(3), pp: 1-112.

Skaggs, W., 2104. Fear of Holes, Scientific American Mind (March/April 2014), 25(12).

Spies, G., Stein, D. J., Roos, a, Faure, S. C., Mostert, J., Seedat, S., & Vythilingum, B. (2009). Validity of the Kessler 10 (K-10) in detecting DSM-IV defined mood and anxiety disorders among pregnant women, Archives of Women's Mental Health, 12(2), pp. 69–74.

Stein, D.J., Bouwer, C.,1997. A Neuro-Evolutionary Approach to the Anxiety Disorders, Journal of Anxiety Disorders, 11(4), pp. 409-429.

Vis, J., 2013. Applied Vision Association Spring Meeting, Manchester, UK 26 March 2013, Abstracts, Perception, 42, pp. 363–370

Vythilingum, B., Stein, D. J., Soifer, S., 2002. Is "shy bladder syndrome" a subtype of social anxiety disorder? A survey of people with paruresis, Depression and Anxiety, 16(2), pp. 84–7.

Woods, D. W., Flessner, C. a., Franklin, M. E., Keuthen, N. J., Goodwin, R. D., Stein, D. J., Walther, M. R., 2006. The Trichotillomania Impact Project (TIP): Exploring phenomenology, functional impairment, and treatment utilization, Journal of Clinical Psychiatry, 67(12), pp. 1877–1888.

Wilkins, A., Nimmo-Smith, I., Tait, A., McManus, C., Della Sala, S., Tilley, A., Arnold, K., Barrie, M., Scott, S., 1994. A Neurological Basis for Visual Discomfort, A Journal of Neurology, 107 (4).

2. Chapter 2: Publication-ready Manuscript

Trypophobia:
An investigation of clinical features

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ABSTRACT

OBJECTIVE: Trypophobia refers to the fear of, or aversion to, clusters of holes. We assessed clinical features of trypophobia, and investigated whether it showed more resemblance to a specific phobia or to obsessive-compulsive disorder.

METHODS: An online survey was conducted to gather information on socio-demographic variables, course and duration, severity, associated features, comorbid psychiatric diagnoses and levels of psychological distress and impairment in individuals with trypophobia. The survey also explored whether such individuals experienced more fear or disgust, and whether symptoms showed more resemblance to a specific phobia or to obsessive-compulsive disorder. Associations of symptom severity and duration with degree of impairment were investigated.

RESULTS: 195 individuals completed the questionnaire. Symptoms were chronic and persistent. The most common associated comorbidities were major depressive disorder and generalized anxiety disorder. Trypophobia was associated with a significant degree of psychological distress and impairment. The majority of individuals experienced disgust rather than fear when confronted with clusters of holes, but were more likely to meet DSM-5 criteria for specific phobia than for obsessive-compulsive disorder. Symptom severity and duration were associated with functional impairment.

CONCLUSIONS: Given that individuals with trypophobia suffer from clinically significant morbidity and comorbidity, this condition deserves better recognition by and further attention from clinicians and researchers.

KEY WORDS: Trypophobia, specific phobia, obsessive-compulsive disorder,
internet survey

INTRODUCTION

Trypophobia refers to a pathological fear of, or aversion to, clusters of concave objects (holes) or objects reminiscent of clusters of holes[1]. Individuals report a phobic or aversive

response to such stimuli, ranging from the visual markings of poisonous fish to seemingly innocuous images such as that of water condensation, beehives, sea sponges and seedpods. Individuals with trypophobia report that the visual quality and spatial properties of such stimuli trigger discomfort[2,3,4,5]. This may differ from phobic or aversive responses to a range of other stimuli, such as animals, where the individual will be uncomfortable in the presence of a non-visible animal. It has been suggested that trypophobia involves images with a particular spectral profile rather than clusters of holes per se[6].

On the one hand, this set of symptoms would seem to be an unusual one, perhaps rarely encountered by the clinician. However, with the emergence of the internet and virtual support groups, and the ability of more people to share information about their concerns and fears, it turns out that trypophobia may be a not uncommon phenomenon. With the growth of online image sharing, a considerable number of individuals have realized they shared a revulsion to photographs of clusters of holes; a revulsion that can reach the level of significant nausea[7].

There are several of internet-based support groups for trypophobia, including a social media site (https://www.facebook.com/groups/3318322299/), where more than 12 000 people provide testimonials and share their experience of living with the fear of or aversion to clusters of concave objects. Individuals describe these images as haunting, and as evoking fear, panic attacks, revulsion, distress as well as a wide variety of somatic symptoms such as nausea, goosebumps and itchiness. Trypophobia has, however, not yet been well characterized by clinicians and is to date largely unreported in the scientific literature.

In this paper, we report the results of a survey of members of an internet-based support group for people with trypophobia. We addressed the following clinical features: socio-demographic factors, course and duration, severity, associated features, comorbid psychiatric diagnoses, levels of psychological distress and impairment, and history of treatment. In addition we explored whether trypophobia showed more resemblance to a specific phobia or to obsessive-compulsive disorder and whether trypophobic stimuli more often triggered feelings of fear or disgust. Associations of symptom severity and duration with impairment were also investigated.

METHODS

The study was approved by the University of Cape Town Faculty of Health Sciences Human Research Ethics Committee, and informed consent was obtained from all participants.

a) Sample

Adult (18 years or older) members of a Facebook support group for trypophobia (which consists of more than 12000 members) were included in the survey. 195 questionnaires were answered, a response rate of 1.6%.

b) Questionnaires

A self-report online questionnaire was used and included items addressing socio-demographic variables, course and duration, severity, associated features and comorbid psychiatric diagnoses. The Kessler Psychological Distress Scale (K10)[8] and the Sheehan Disability Scale[9] were used to measure psychological distress and impairment respectively. Also included were items addressing treatment history. Items from the Zohar-Fineberg Obsessive Compulsive Screen (ZF-OCS)[10] and questions derived from the DSM-5[11] diagnostic criteria for specific phobia and obsessive-compulsive disorder were included to assess whether trypophobia showed more resemblance to specific phobias or obsessive-compulsive disorder, and respondents were asked whether trypophobic stimuli triggered feelings of predominant fear or disgust.

c) Statistical analysis

Descriptive statistics were calculated (means and standard deviations for continuous variables and frequencies for categorical variables). T-tests and chi-square analyses were used as appropriate to compare the group of individuals who experienced predominantly fear to the group of individuals who experienced predominantly disgust in relation to their trypophobia. Pearson correlation coefficients were used to measure the strength of linear associations between variables.

RESULTS

a) Socio-demographic features

Respondents were predominantly female (83.6%). They ranged in age from 18 to 80 years (mean = 36.4; SD = 12.9). 77.4% of subjects had completed high school, and 57.4% had completed a university or college degree. 40% of subjects were married while 26.7% were single and had never married. 53.5% of subjects were employed full time, 11.3% were completing further studies, and 8.2% were employed part time. Respondents from all over the world participated, but the majority resided in the United States and the United Kingdom.

b) Clinical features

I. Precipitating factors and family history

78.5% of respondents reported that they did not have a previous distressing experience involving holes or clusters of holes that might have predisposed them to developing trypophobia. 24.6% of respondents had first degree relatives with trypophobia.

II. Course and duration

Symptoms were chronic and persistent, with a mean age of onset of 17.5 years (SD = 12.9; range = 4 – 75 years of age). The mean duration of symptoms at the time of the survey was 18.0 years (SD = 15.1; range 0 - 60 years). 82.6% of respondents denied having even brief periods of remission of symptoms. A mean of 5.4 hours per week (SD = 9.5; range = 0 - 75) was spent worrying about clusters of holes. 20% of respondents reported experiencing trypophobia once a day, 39.5% once a week, 25.1% once a month, 9.7% once a year and 2.6% less than once a year. 81% of respondents experienced trypophobia even when not directly confronted with clusters of holes (for example they worried about coming into contact with clusters of holes).

III. Severity

14.4% of respondents reported no anxiety related to their trypophobia, 24.1% of respondents reported mild anxiety, 29.7% moderate anxiety, 15.4% severe anxiety without panic attacks and 16.4% severe anxiety with panic attacks. Respondents who did suffer from panic attacks had on average 4.4 panic attacks per month (SD = 5.4; range 1 - 25).

In the group reporting predominantly fear in relation to their trypophobia, 2.0% experienced mild anxiety, 2.0% experienced moderate anxiety, 1.3% experienced severe anxiety without panic attacks and 2.0% experienced severe anxiety with panic attacks. In the group reporting predominantly disgust in relation to their trypophobia, 25.5% experienced mild anxiety, 27.5% moderate anxiety, 14.4% severe anxiety without panic attacks and 7.8% severe anxiety with panic attacks.

IV. Associated features

67.2% of respondents reported itchiness, 67.2% reported goosebumps and 53.8% reported nausea when confronted with clusters of holes. 45.6% of respondents felt embarrassed by their trypophobia.

V. Comorbid psychiatric diagnoses

19.0% of respondents had been diagnosed with major depressive disorder while 8.7% suspected that they suffered from this. 3.6% of participants had been diagnosed with bipolar mood disorder, but 8.2% suspected that they had the diagnosis. 3.1% had been diagnosed with obsessive-compulsive disorder and 14.9% suspected that they had this condition. 1.02% had been diagnosed with a specific phobia (unrelated to the fear of clusters of holes) whilst 7.7% of the study population suspected that they suffered from this. 17.4% of the respondents had been diagnosed with generalized anxiety disorder, while another 11.8% suspected that they had the diagnosis. 6.15% suffered from panic disorder, and 8.2% suspected that they had panic disorder. 8.2% had been diagnosed with social anxiety disorder, and 13.9% suspected that they suffered from this.

In the screen for other specific phobias using questions derived from the DSM-5 criteria, 41.5% of people reported a fear of animals (e.g. spiders, insects or dogs), 31.3% reported a fear of the natural environment, 24.1% a fear of blood, injections or injury,

37.9% a fear of certain situations (e.g. airplanes, elevators or enclosed spaces) and 24.1% reported a fear of other specific things, excluding clusters of holes. 14.4% of the above respondents fulfilled all the DSM-5 criteria for other specific phobias, and 30.3% fulfilled all the DSM-5 criteria for other specific phobias, with the exception of the distress and impairment clinical criterion.

In the screen for symptoms of obsessive-compulsive disorder (not related to trypophobia) using the ZF-OCS, 33.3% of participants reported that they washed and cleaned a lot, 39.5% reported that they frequently checked things, 34.4% reported that they experienced recurrent thoughts that keeps bothering them, 28.2% reported that their daily activities took a long time to finish, and 40% were concerned about orderliness and symmetry.

VI. Impairment

Psychological distress: K10

18.7% of respondents reported a low level of psychological distress, 30.8% reported a moderate level, 25.8% a high level, and 24.7% a very high level of psychological distress.

Disability

The Sheehan Disability Scale (SDS) utilizes three independent work, social life and family life disability measures. A score of 5 or greater on any of these scales is associated with significant functional impairment[9]. 15.4% of respondents scored 5 or higher on the work or schoolwork sub-scale. 13.3% scored 5 or higher on the social life or leisure activities subscale, and 15.9% scored 5 or higher on the family life or home responsibilities subscale. When asked how many days during the last week trypophobic symptoms caused them to miss school or work, or make them unable to carry out their normal daily responsibilities, 4.1% of respondents reported missing 1 day, 1.5% of respondents reported missing 2 days, 1.5% reported missing 3 days and 0.5% reported missing 4 days.

When asked how many days during the last week they felt so impaired by trypophobia, that even though they went to school or work, their productivity was reduced, 7.7% of

participants reported 1 day, 5.1% reported 2 days, 3.1% reported 3 days, 0.5% reported 4 days, 2.1% reported 5 days, 0.5 % reported 6 days, and 2.1% reported 7 days.

VII. Treatment history

89.2% of respondents had never received or seeked treatment for trypophobia. 2.6% received medication, 2.6% received cognitive-behavioural therapy and 2.6% received other therapy. 3% of participants received a combination of medication and therapy. Of the people who did receive treatment, about 50% found this to be helpful.

With regards to self-help, 50.3% of respondents spent less than one hour per week, and 24.1% more than one hour per week, on an online support group for trypophobia. 49.8% of respondents found an online support group helpful in alleviating symptoms of trypophobia.

c) Resemblance to specific phobia or obsessive-compulsive disorder

29.7% of participants' trypophobic symptoms fulfilled all the DSM-5 criteria for specific phobia, while 51.79% fulfilled all the DSM-5 criteria for specific phobia with exception of the distress or impairment clinical criterion. 2% of participants fulfilled all the DSM-5 criteria for obsessive-compulsive disorder (with obsessions related to trypophobia), while 3.6% fulfilled the DSM-5 criteria for obsessive-compulsive disorder with exception of the distress or impairment clinical criterion.

Fear versus disgust

11.8% of respondents reported only disgust and 60.5% reported mostly disgust when confronted with clusters of holes, while 1% experienced only fear and 5.1% reported mostly fear. 21% of respondents experienced the same amount of fear and disgust.

7.8% of the predominantly fear group and 92.2% of the predominantly disgust group experienced both itchiness and nausea. 7.9% of the predominantly fear and 92.1% of the predominantly disgust group experienced goosebumps. This is in keeping with literature

that suggests that itchiness, nausea and goosebumps are more commonly associated with disgust.

91.7% of males and 92.1% of females experienced predominantly disgust, while 8.33% of males and 7.9% of females experienced predominantly fear in relation to their trypophobia.

The difference in average duration of symptoms among the predominantly fear versus the predominantly disgust groups were not statistically significant ($t = -0.3$, $p = 0.7$). There was also not a statistically significant difference between the predominantly fear and predominantly disgust group when comparing the hours per week spent thinking or worrying about clusters of holes ($t = -0.5$, $p = 0.6$).

In the group with predominantly fear in relation to their trypophobia, 100.0% fulfilled the DSM-5 criteria for obsessive-compulsive disorder, while 66.6% fulfilled the DSM-5 criteria for specific phobia.

In the group with predominantly disgust in relation to their trypophobia, 70% fulfilled the DSM-5 criteria for obsessive-compulsive disorder, and 46.0% fulfilled the DSM-5 criteria for specific phobia.

d) Associations

There were significant associations between the hours per week spent thinking or worrying about clusters of holes and each of the SDS subscales. There were also significant associations between the subjective experience of anxiety, and each of the SDS subscales.

Duration of symptoms was also significantly associated with impairment on the work/school sub-scale of the SDS ($p = 0.024$).

There were associations between the number of panic attacks experienced per month and impairment on the SDS subscales, and a significant association between the number

of panic attacks per month and the reduction of productivity as a result of trypophobia (Spearman r = 0.55, $p < 0.001$).

The degree of impairment in the group with predominantly fear and the group with predominantly disgust did not significantly differ.

DISCUSSION

The main findings of this study were that 1) individuals who suffer from trypophobia were predominantly female, well educated and employed, 2) trypophobia was chronic and persistent with an average age of onset in the teenage years, 3) the majority of individuals reported anxiety related to trypophobia, but it ranged in severity, 4) the most common comorbid psychiatric diagnoses were major depressive disorder and generalized anxiety disorder, 5) trypophobia was associated with a significant degree of psychological distress and impairment but the majority of individuals had never sought treatment, 6) a significantly larger percentage of individuals fulfilled the DSM-5 criteria for specific phobia as opposed to obsessive-compulsive disorder, 7) individuals with trypophobia more commonly experienced disgust as opposed to fear in response to clusters of holes, and 8) there were significant associations between the symptom severity and duration of trypophobia and levels of impairment.

The socio-demographic data suggested that individuals who suffer from trypophobia were predominantly female. This corresponds with the demographics of the anxiety disorders of the DSM-5. The mean age of participating individuals was 36.4 years, and the majority was well educated and employed.

Symptoms related to trypophobia were chronic and persistent, and most respondents denied having even brief periods of remission of symptoms. The mean age of onset was 17.5 years. These findings are consistent with the onset, course and duration of DSM-5 anxiety disorders.

A degree of anxiety was reported by the majority of individuals with trypophobia (85.6%), ranging from mild anxiety to severe anxiety with panic attacks. Anxiety was more in

frequency and severity in the group with predominantly disgust in relation to their trypophobia (75.2%), as compared to the group with predominantly fear in relation to their trypophobia (7.3%).

With regards to comorbid psychopathology, 18.97% of respondents had been diagnosed with major depressive disorder, 17.43% with generalized anxiety disorder, 6.15% with panic disorder and 8.2% with social anxiety disorder. Given the relatively high incidence of comorbid psychiatric diagnoses, it is of utmost importance to screen all patients presenting with trypophobia for comorbid mood and anxiety symptoms. The relatively low incidence of comorbid social anxiety disorder is interesting when taking into account a study that evaluated the hypothesis that social anxiety is directly linked to discomfort due to human face clusters resembling the visual quality of trypophobic imagery[12].

Trypophobia was associated with a great deal of psychological distress and impairment, and affected work, social and home life. According to the K10 psychological distress scale, 81.32% of respondents reported levels of psychological distress varying from mild to severe. These findings reinforce the notion that trypophobia is a clinically significant phenomenon with substantial morbidity, warranting clinical attention.

Despite the great degree of psychological distress and impairment experienced as a result of trypophobia, the majority of individuals (89.2%) had never seeked treatment specifically for trypophobia. Of the people who did receive treatment, 50% found it to be helpful.

Online support groups appeared to play an important role for many of its members. For those with rare symptomatology that is not yet officially recognized in scientific literature, the anonymity of the internet may present the only opportunity to openly discuss information and provide support to others struggling with the same symptoms. 49.8% of respondents found an online support group helpful and it could be argued that this provided substantial, albeit informal, therapeutic effect.

A significantly larger percentage of individuals fulfilled the DSM-5 criteria for specific phobia as opposed to obsessive-compulsive disorder. Arguably there is sufficient data to suggest that trypophobia should be classified as a specific phobia in DSM-5. These

findings are interesting when taking into account that the majority of participants experienced trypophobia even when not directly confronted with clusters of holes (for example, they worried about coming into contact with clusters of holes). This is reminiscent of recurrent, intrusive thoughts and images as seen obsessive-compulsive the disorder, as opposed to the nature of specific phobias.

The majority of individuals experienced disgust rather than fear when confronted with clusters of holes. This is also a surprising finding, as it is known from the literature that disgust is more commonly associated with obsessions as seen in obsessive-compulsive disorder, as opposed to fear seen more commonly in specific phobias.

Duration and severity of symptoms related to trypophobia was significantly associated with impairment as measured by the SDS. Trypophobia is therefore sufficiently remarkable to warrant clinical attention and it can be argued that it should be screened for during clinical interviews.

There were a number of important limitations. Our findings were based on a survey in a convenience sample consisting of a mixed group of individuals with self-reported fear of clusters of holes, and may not extrapolate to other populations. A homogeneous sample of individuals with trypophobia is yet to be studied systematically in a clinical setting. Demographic results of this survey suggested that individuals who suffer from trypophobia were predominantly female. It is a well-known fact that females are more willing to participate in research, and therefore it could just have been that females were keener to complete the survey than males. Also, the low response rate may suggest a non-response sampling bias. That said, the recruitment method may also be a strength of the study, as it has been argued that the Internet holds promise as a way to recruit more, rather than less, representative samples for research (Reips, 2000).

Our findings highlight the significance of the phenomenon of trypophobia that is yet largely undescribed in scientific literature. The condition has significant morbidity and comorbidity and warrants clinical attention. The data gathered highlights the need for a thorough longitudinal study to shed further light on diagnostic classification, clinical features and treatment.

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DISCLOSURE

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REFERENCES

1. Cole GG, Wilkins AJ. Fear of holes. Psychological Science. 2013;24:1980–1985.

2. Fernandez D, Wilkens AJ. Uncomfortable images in art and nature. Perception. 2008;37:1098–1113.

3. Hare LO, Hibbard PB. Spatial frequency and visual discomfort. *Vision Res*. 2011;51:1767–1777.

4. Wilkins A, Nimmo-Smith I, Tait A, McManus C, Della Sala S, Tilley A, Arnold K., Barrie M, Scott S. A Neurological Basis for Visual Discomfort. *Brain.* 1984;107:989-1017.

5. Imaizumi S, Furuno M, Hibino H, Koyama S. Trypophobia is predicted by disgust sensitivity, empathic traits, and visual discomfort. *SpringerPlus*, 2016;5:1449.

6. Le ATD, Cole GG, Wilkins AJ. Assessment of trypophobia and an analysis of its visual precipitation. *Q J Exp Psychol (Hove).* 2015;68:2304-22.

7. Skaggs W. Fear of Holes. *Sci Am*. 2104;25:12.

8. Spies G, Stein DJ, Roos A, Faure SC, Mostert J, Seedat S, Vythilingum B. Validity of the Kessler 10 (K-10) in detecting DSM-IV defined mood and anxiety disorders among pregnant women. *Archives of Women's Mental Health*. 2009;12:69–74.

9. Sheehan DV, Harnett-Sheehan K, Raj BA. The measurement of disability. *Int Clin Psychopharmacol.* 1996;11:1-112.

10. Fineberg NA, Krishnaiah RB, Moberg J, Doherty CO. Clinical Screening for Obsessive-Compulsive and Related Disorders. *Isr J Psychiatry Relat Sci.* 2008;45:151–163.

11. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, Fifth edition.* Arlington,VA, American Psychiatric Association; 2013.

12. Chaya K, Xue Y, Uto Y, Yao Q, Yamada Y. Fear of eyes: triadic relation among social anxiety, trypophobia, and discomfort for eye cluster. *PeerJ*. 2016 May.

3. Appendices

Appendix A: Questionnaire

For the purposes of this questionnaire, Trypophobia is defined as the fear of/ aversion (disgust) to clusters of holes or bumps.

- **Do you have a fear of clusters of holes or bumps, or do you find it disgusting?**
- **Are you 18 years of age or older?**

If the answers to both of the above are yes, please feel free to proceed.

A. Socio-demographic detail

1. **How old are you?**

2. **Are you male or female?**
- Male
- Female

3. **In which country were you born?**

4. **What is the highest level of education you have completed?**
- University/college or equivalent
- Intermediate between high school and university (e.g. technical training)
- High school
- Primary school only (or less)

5. What is your current marital status?

- Single, never married
- Married or domestic partnership
- Widowed
- Divorced
- Separated

6. Employment status: Are you currently…?

- Employed, full time
- Employed, part time
- Still in school
- Completing further studies
- Out of work and looking for work
- Out of work but not currently looking for work
- A homemaker
- Retired
- Receiving disability or unable to work
- Other

B. Duration, course and severity

7. How old were you when you first experienced Trypophobia? Please answer in years.

8. Did you have a bad experience involving holes/ cluster of holes of bumps in the past, that you think might have caused your Trypophobia?

- Yes
- No

9. If your answer to the question 8 is yes, please tell of your experience briefly. Otherwise continue to question 10.

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10. How many years have you suffered from Trypophobia?

11. After your Trypophobia started, have you had periods shorter than 6 months where your symptoms have cleared up?

- Yes
- No

12. After your Trypophobia started, have you had periods longer than 6 months where your symptoms have cleared up?

- Yes
- No

13. How severe would you rate your Trypophobia?

- No anxiety
- Mild anxiety

- Moderate anxiety
- Severe anxiety without panic attacks *(a sudden surge of intense fear or discomfort that reaches a peak within minutes, and during which time 4 (or more) of the following symptoms appear: pounding heart or fast heart rate, sweating, trembling or shaking, a feeling of shortness of breath or smothering, feelings of choking, chest pain or discomfort, nausea or stomach discomfort, feeling dizzy or faint, feelings of chills or heat, feelings of numbness or tingling, feelings of unreality or of being detached from yourself, fear of losing control or going crazy, fear of dying)*
- Severe anxiety with panic attacks that are caused your Trypophobia?

14. **If you do suffer from panic attacks related to your Trypophobia, how many panic attacks do you get, on average, per week? If you don't suffer from panic attacks, please proceed to question 15.**

- 1-2
- 3-4
- 5-7
- 8-10
- >10

15. I experience Trypophobia…

- Only when I see clusters of holes/bumps, or pictures of clusters of holes/bumps. The moment I look away from these pictures, I am not bothered by them any longer.
- Even when I am not looking at clusters of holes/bumps, or pictures of clusters of holes/bumps. Thoughts about it keep pestering me even when I look away from them, or I fear coming into contact with clusters of holes/bumps.

16. How many hours per week, on average, do you spend thinking about clusters of holes/bumps?

17. How many hours per week, on average, do you experience distress/anxiety/fear/disgust because of your Trypophobia?

18. How often do you experience Trypophobia?

- At least once a day
- At least once a week
- At least once a month
- At least once a year
- Less than once a year

19. **When looking at an image of clusters of holes/bumps, which of the following describes your experience the best?**

- I experience only fear
- I experience only disgust/ repulsion
- I experience mostly fear, but also disgust/ repulsion
- I experience mostly disgust/ repulsion, but also fear
- I experience the same amount of fear and disgust/ repulsion

20. Do you experience itchiness when you look at clusters of holes or bumps?

- Yes
- No

21. Do you experience nausea when you look at clusters of holes or bumps?

- Yes

- No

22. Do you get goosebumps when you look at clusters of holes or bumps?
- Yes
- No

23. Do you feel embarrassed or humiliated by your Trypophobia?
- Yes
- No

24. Have you ever received any of the following treatments for your Trypophobia?
- Councelling
- Cognitive Behavioural Therapy (CBT)
- Exposure therapy
- Medication
- Other
- No, I have never received treatment for my Trypophobia.

25. If you have received treatment, have you found it to be helpful? If you have never received treatment, please skip this question and proceed to question 26.

26. How many hours per week, on average, do you spend on an online support group for Trypophobia?

27. On a scale from 1-5, how helpful do you find an online support group for Trypophobia (0= not helpful at all, 5 = extremely helpful)?
- 1
- 2
- 3
- 4
- 5

28. Do you have any family members (they have to be blood relatives) also suffering from Trypophobia?
- Yes
- No

C. Trypophobia as a specific phobia (DSM-5 based questions)

29. Do you have a fear or anxiety about clusters of holes or bumps?
- Yes
- No

30. Do clusters of holes or bumps almost always immediately cause fear or anxiety?
- Yes
- No

31. Do you actively try to avoid clusters of holes or bumps or otherwise endure looking at it with intense fear and anxiety?

- Yes
- No

32. Do you think your fear or anxiety is out of proportion to the actual danger posed by clusters of holes or bumps?
- Yes
- No

33. Is your fear, anxiety or avoidance of clusters of holes or bumps lasting longer than 6 months?
- Yes
- No

34. Does your fear, anxiety or avoidance of clusters of holes or bumps make you very upset or does it interfere with important areas of your daily life (for example your work, social life or relationships)?
- Yes
- No

D. Trypophobia as a form of OCD (DSM-5 based questions)

35. Do you have recurrent and repeating thoughts of clusters of holes/ bumps that you experience as intrusive and unwanted, and that cause you anxiety or distress?
- Yes
- No

36. Do you try to ignore these thoughts or try to put them out of your mind by thinking some other thought or by doing specific things?
- Yes
- No

37. Do you feel that you have to do certain things over and over again (actions e.g. hand washing, ordering, checking) or think certain thoughts over and over again (mental acts e.g. praying, counting or repeating words silently) in an attempt to make the thoughts of clusters of holes/bumps go away or to relieve your anxiety?
- Yes
- No

If your answer to question 37 is yes, please answer questions 38 and 39. If your answer is no, please proceed to question 40.

38. Do the actions or mental acts in question 31 prevent or relieve the anxiety caused by your Trypophobia?
- Yes
- No

39. Do you realize that the actions or mental acts in question 31 are not connected in a realistic way to clusters of holes/bumps, or that they are clearly excessive?
- Yes
- No

40. Do thoughts of clusters of holes/bumps, or actions/mental acts to avoid these thoughts or to relieve anxiety, often take up more than 1 hour of your day?

- Yes
- No

41. Do thoughts of clusters of holes/bumps, or actions/mental acts to avoid these thoughts or to relieve anxiety, cause you significant distress, or does it interfere with important areas of your daily life (for example your work, social life or relationships?

- Yes
- No

E. Comorbidities:

42. Have you ever been diagnosed with one of the following psychiatric disorders, recently or in the past? You may choose more than one option.

- Major depressive disorder
- Dysthymic disorder
- Bipolar mood disorder
- Schizophrenia
- Obsessive compulsive disorder *(apart from obsessions/compulsions related to your Trypophobia)*
- Specific phobia *(apart from your Trypophobia)*
- Generalized anxiety disorder
- Panic disorder
- Social anxiety disorder
- Seperation anxiety disorder (as a child)
- Other psychiatric disorder
- No, I have never been diagnosed with a psychiatric disorder.

43. **Have you ever suspected that you may suffer from one of the following psychiatric disorders, even though you have not been diagnosed? You may choose more than one option.**

- Major depressive disorder
- Dysthymic disorder
- Bipolar mood disorder
- Schizophrenia
- Obsessive compulsive disorder *(apart from obsessions/compulsions related to your Trypophobia)*
- Specific phobia *(apart from Trypophobia)*
- Generalized anxiety disorder
- Panic disorder
- Social anxiety disorder
- Seperation anxiety disorder (as a child)
- Other psychiatric disorder
- No, I do not suspect that I have any psychiatric disorder, apart from Trypophobia.

E.1. Specific phobia screen (DSM-V based questions)

44. Do you have a fear or anxiety about …

a) Animals (e.g. spiders, insects or dogs)

- Yes
- No

b) Natural environment (e.g. heights, storms or water)

- Yes
- No

c) Blood/injections/injury (e.g. needles, injury or invasive medical procedures such as blood transfusions)

- Yes
- No

d) Certain situations (e.g. airplanes, elevators or enclosed spaces)

- Yes
- No

e) Other specific things (*excluding fear of clusters of holes/ bumps*)

- Yes
- No

If your answer to *a, b, c, d or e* is yes, please continue to answer questions 45 to 49. **Please answer in relation to the thing you are most afraid of, whether it is a,b,c,d or e.** If your answer to all of the above is No, please proceed to question 50.

45. **When you are exposed to *a, b, c, d or* e, do you almost always immediately experience fear or anxiety?**
    - Yes
    - No

46. **Do you avoid a, b, c, d or e, or otherwise endure facing it with intense fear and anxiety?**
    - Yes
    - No

47. **Is your fear or anxiety out of proportion to the actual danger posed by a, b, c, d or e?**
    - Yes
    - No

48. **Is your fear, anxiety or avoidance of a, b, c, d or e lasting longer than 6 months?**
    - Yes
    - No

49. **Does your fear, anxiety or avoidance of a, b, c, d or e cause you distress or does it interfere with important areas of your daily life (for example your work, social life or relationships)?**
    - Yes
    - No

E.2. Zohar-Fineberg Obsessive-Compulsive Screen

These questions are designed to screen for the presence of obsessive-

compulsive disorder apart from Trypophobia. Please tick the response you think is correct, and ***unrelated to your Trypophobia.***		
	Yes	No
50. Do you wash or clean a lot?		
51. Do you check things a lot?		
52. Are there any thoughts (apart from those about clusters of holes/bumps) that keep bothering you that you would like to get rid of but can't?		
53. Do your daily activities take a long time to finish?		
54. Are you concerned about orderliness or symmetry?		

E.3. K10 Test

These questions concern how you have been feeling over the past 30 days. Tick a box below each question that best represents how you have been.

54. During the last 30 days, about how often did you feel tired out for no good reason?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All of the time

55. During the last 30 days, about how often did you feel nervous?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All of the time

56. During the last 30 days, about how often did you feel so nervous that nothing could calm you down?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All of the time

57. During the last 30 days, about how often did you feel hopeless?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All of the time

58. During the last 30 days, about how often did you feel restless or fidgety?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All of the time

59. During the last 30 days, about how often did you feel so restless you could not sit still?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All of the time

60. During the last 30 days, about how often did you feel depressed?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All of the time

61. During the last 30 days, about how often did you feel that everything was an effort?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All of the time

62. During the last 30 days, about how often did you feel so sad that nothing could cheer you up?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All of the time

63. During the last 30 days, about how often did you feel worthless?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All of the time

E.4. SHEEHAN DISABILITY SCALE: A BRIEF, PATIENT RATED, MEASURE OF DISABILITY AND IMPAIRMENT

Please mark ONE circle for each scale, RELATED TO YOUR TRYPOPHOBIA

64.

WORK* / SCHOOL

The symptoms have disrupted your work / school work:

Not at all	Mildly			Moderately			Markedly			Extremely
0	1	2	3	4	5	6	7	8	9	10

☐ I have not worked /studied at all during the past week for reasons unrelated to the disorder.

* Work includes paid, unpaid volunteer work or training

65.

SOCIAL LIFE

The symptoms have disrupted your social life / leisure activities:

Not at all	Mildly			Moderately			Markedly			Extremely
0	1	2	3	4	5	6	7	8	9	10

66.

FAMILY LIFE / HOME RESPONSIBILITIES

The symptoms have disrupted your family life / home responsibilities:

Not at all	Mildly			Moderately			Markedly			Extremely
0	1	2	3	4	5	6	7	8	9	10

67. DAYS LOST

On how many days in the last week did your symptoms cause you to miss school or work or leave you unable to carry out your normal daily responsibilities? __________

68. DAYS UNDERPRODUCTIVE

On how many days in the last week did you feel so impaired by your symptoms, that even though you went to school or work, your productivity was reduced? __________

Appendix B: Information sheet and consent form

Dear participant,
Thank you in advance for taking part in this study - your participation will help us understand the phenomenon of Trypophobia and, eventually, could help the condition to be officially recognized.

An overview of this survey:

You will be asked to complete a questionnaire regarding the type of symptoms you experience. The survey is anonymous and would ask no information that could identify you.

Please try to answer all questions. If, however, you are not willing to answer a question, you are welcome to proceed to the next. In total the questionnaire consists of 68 questions (most of them multiple choice) and will take about 15-20 minutes to complete.

You will not be remunerated for taking part in this study.

There are no expected risks of taking part in this research.

If you choose to participate in this study, there will be no direct benefit to you; however the information obtained from this study will give a better understanding of Trypophobia and might help the condition to be officially recognized in the future.

Each participant may only complete the questionnaire once.

You may only participate in this study if you are 18 years of age or older.

No images are included in the questionnaire that may trigger your Trypophobia.

Confidentiality

All information obtained from participants will be kept strictly confidential and anonymous. You will not be asked to disclose any identifying information such as telephone numbers, e-mail addresses, etc.
Only the research team will have access to the questionnaires, and it will be stored in a secure database until deleted by the primary investigator at the

completion of the research.

Contact and Questions:

Feel free to direct any questions at any time during or after the questionnaire to Michelle Barnard at michellebarnrd@gmail.com.

Should you feel worried or distressed by your symptoms, please seek help from your local health care provider. Should you require further information on Trypophobia or other mental health care issues, please contact michellebarnrd@gmail.com, and it would be provided at no cost.

Clicking the "agree" button below indicates that:

You have read and understood the above information, and voluntarily consent (agree) to participate. You understand that the online survey can be terminated by closing the web-browser. You are 18 years of age or older.

- **Agree to consent**
- **Disagree to consent**

UNIVERSITY OF CAPE TOWN
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17 August 2015

HREC REF: 424/2015

Prof D Stein
Psychiatry & Mental Health
J-2
GSH

Dear Prof Stein

PROJECT TITLE: TRYPOPHOBIA: AN INVESTIGATION OF CLINICAL FEATURES-(MMed-candidate-Dr M Vlok-Barnard)

Thank you for your response letter dated 07 August 2015, addressing the issues raised by the Human Research Ethics Committee (HREC).

It is a pleasure to inform you that the HREC has formally approved the above-mentioned study.

Approval is granted for one year until the 30th August 2016.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

We acknowledge that the following student: Dr M Vlok-Barnard is also involved in this project.

Please quote the HREC reference no in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE
Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938
This serves to confirm that the University of Cape Town Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research

Hrec/ref:424/2015

Council (MRC-SA), Food and Drug Administration (FDA-USA), International Convention on Harmonisation Good Clinical Practice (ICH GCP) and Declaration of Helsinki guidelines.

The Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.