An Investigation Into The Impact of Virtual Reality Character Presentation on Participants’ Depression Stigma

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Abstract. There is a large body of research investigating who stigmatises mental illnesses, why they do so, and the factors that mediate these thoughts and behaviours. Depression stigma in particular has been widely studied using written vignettes to depict a character with depression. While vignettes provide easily manipulatable experimental tools for measuring people’s reactions to a diagnosed character, they lack the capacity to depict a character’s expressions and actions. This has led to concerns about their ecological validity. This study attempted to increase the ecological validity of traditional vignette studies by presenting a virtual character and then measuring the participant’s stigma towards depression. Participants were presented with either a depression or control vignette and then both groups interacted with a virtual human with experimentally manipulated eye contact behaviours. Initial exploration of the data suggests that previously reported effects of diagnosis when using written vignettes may not generalise to more dynamic and interactive virtual social situations, and thus may not hold up in real life situations. The use of virtual reality uniquely allowed for testing such complex questions.

Keywords. Virtual Reality, Virtual Human, Research Methods, Social Interaction, Depression Stigma

1. Introduction

The power of labels is long established [1]. Diagnostic labels are known to elicit emotions such as anger, sympathy and fear towards persons with mental disorders including depression [2,3]. Many of these studies report negative thoughts, feeling and intended actions towards people diagnosed with depression [4,5]. These reactions towards diagnosed individuals seem to be present in a wide variety of populations including the general public and psychology students [6]. It is important to understand the aspects of mental illness that illicit such reactions, considering that fear of stigma can discourage help seeking and hinder recovery [5,7]. As such, it is important to study the possible reasons why people stigmatise individuals with a depression diagnosis. In relation to the label itself, it is purposed that diagnostic labels may amplify a person’s perceptions of the differences between themselves and a diagnosed individual, promoting the idea that individuals who share a diagnosis are a collective entity.

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This can lead to a society where labels and perceived negative difference are socially salient, resulting in increased stigmatization.

Written vignettes are frequently used to assess depression stigma [9]. Their manipulability allows for measuring the extent to which a particular stereotype or label is stigmatised by participants. As such, they have high internal validity, consistency, and control. However, Link et al. [9] point out that vignettes do not provide insight into a character’s actions (e.g., expressions, gestures, eye contact) that may be involved in a real-world interaction, leading to reduced ecological validity. Dolphin and Hennessy have sought to improve the validity of vignette methods by using audio-visual vignettes [10]. However, the use of fixed recordings of actors did not allow for interactivity between the participant and the vignette character. Many assessment tools used in the clinical and social neurosciences suffer similar criticisms to vignettes [11]. Psychologists are increasingly utilising virtual environments and virtual human vignettes for assessing bias [12], personality [13] and simulating clinical symptoms [14]. Virtual environments allow for the impact of character actions to be explored in stigma studies, which may curtail some of the shortcomings illustrated by Link et al. [9]. For example, ecological validity can be raised by including bodily movements and social cues. In this study, we use eye contact behaviour to explore this. Eye contact was chosen as previous findings indicate that it may exert influence on attributions of humanness [15] and that avverted eye gaze from virtual avatars can elicit emotional responses in participants [16].

In an effort to build on the work of Dolphin and Hennessy [10] the present study aimed to pilot the use of a virtual human as a dynamic, ecologically valid method to explore the impact of diagnosis and character action on participants’ stigma. Specifically, we aimed to assess whether previously reported effects of diagnosis when using vignettes generalise to virtual social situations with more dynamic and interactive qualities than traditional written vignettes. Effects of mental health diagnosis (depressed versus control vignette character) and virtual character action (eye movement behaviour) is explored.

2. Methods

2.1. Research Design

This lab-based experiment used a 2×2 independent groups design. Written vignette (depression labelling vs. control) and virtual character action (interactive eye-contact vs. no interactive eye-contact) were the between subjects grouping variables. The two dependent variables were participants’ subjective personal and perceived stigma.

2.2. Participants

Sixty-two participants completed the experiment. Of these, seven were excluded from the analysis as they reported through the Level of Contact Report (LRC; 17) that they themselves had a diagnosed mental health condition. One participant was excluded for indicating during debriefing that they had not followed the instructions correctly. Thus, the final sample included 54 participants (26 females, 28 males; age: $M = 22.06$, $SD = 5.61$). Twenty-five participants had an educational background likely to include mental health content (e.g., psychology (social sciences and nursing) and twenty-nine fell into an ‘other’ field of study (e.g. natural sciences). The sample mean score for the Level of Contact Report was 8.76/12.

2.3. Measures

The relevant subscales of the Depression Stigma Scale (DSS) [18] were used to measure participants’ personal stigma and perceived stigma towards depression. The personal stigma subscale measures the participant’s own stigma. The perceived stigma subscale measures the extent to which the participants perceive depression to be stigmatised by the general public
The LCR (17) was used to measure participants previous contact with mental illness given that interaction with people with a diagnosed mental health problem can reduce stigma. The scale runs from 1 (no previous contact) to 12 (I have a diagnosed mental illness).

2.4. Materials and Procedure

Participants were immersed in a virtual environment café (VEC) which was run on an ASUS computer using the Oculus program and Oculus Rift headset. The environment was presented using the “Coffee Without Words” simulation, in which the participant interacts with a virtual stranger in a real-world setting. The café included various virtual bystanders and ambient sounds of chatter that would be typical of this setting in the real world. With the exception of eye contact behaviours, the virtual human’s gender (Male) and behaviour (head and body movements) were kept consistent across conditions. Participants were exposed to a traditional written vignette that either described a character diagnosed with major depressive disorder (adapted from Griffiths et al, [20]) or a control character with symptoms of temporary low mood triggered by poor exam results. Following this, participants experienced a virtual environment café (VEC) where they interacted with the character. The character’s actions and behaviours were fixed across conditions with the exception of eye contact. This was manipulated whereby the virtual character actively trying to avoid eye contact with half the participants and the other participants saw the virtual character actively attempting to make eye contact with them. Following the virtual reality (VR) experience, participants filled in open-ended questions about the virtual human interaction (for a separate research hypothesis that is not reported here). Finally participants filled in the DSS [18] and LCR [17] and were debriefed.

3. Results

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean Perceived Stigma (SD)</th>
<th>Mean Personal Stigma (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control + EC</td>
<td>13</td>
<td>17.60 (4.01)</td>
<td>7.69 (3.54)</td>
</tr>
<tr>
<td>Control + NEC</td>
<td>14</td>
<td>19.14 (4.17)</td>
<td>8.57 (4.72)</td>
</tr>
<tr>
<td>Exp + EC</td>
<td>14</td>
<td>16.78 (5.37)</td>
<td>6.28 (3.91)</td>
</tr>
<tr>
<td>Exp + NEC</td>
<td>13</td>
<td>18.6 (4.72)</td>
<td>7.84 (3.34)</td>
</tr>
</tbody>
</table>

Control: Control Vignette, Exp: Experimental Vignette, EC: Eye contact NEC: No Eye Contact

Groups did not differ significantly in gender, age, previous contact with mental illness, education level or college major indicating that groups were comparable on key demographics and could be compared for difference in personal and perceived stigma. Both the perceived ($\alpha = .627$) and personal ($\alpha = .639$) subscales of the DSS had good internal reliability and both were normally distributed. Factorial Analysis of Variance (ANOVA) was used to measure differences in stigma towards the VR character presented as depressed or the control VR character. The dependent variables were perceived stigma and personal stigma. The independent variables in both cases were vignette (depression versus control) and character action (eye contact offered versus no eye contact offered) with previous contact with mental illness included as a covariate for both analyses. No significant effect of vignette type or character interaction on participant’s personal stigma ($F(2,54) = 0.121, p = 0.73; \eta^2_p = .002$) nor perceived stigma ($F(2,54) = 0.85, p = 0.77; \eta^2_p = .002$) was observed.

4. Discussion

This study used a novel approach by incorporating virtual reality into the widely used vignette methodology. The aim was to explore the effect of a diagnosis of major depressive disorder on stigma towards a virtual character following an interactive virtual social interaction. The study also sought to explore whether character action contributed to participants’ reported stigma. Results revealed no significant effect of diagnosis or virtual
character action on stigma. Initial exploration of the data suggests that previously reported effects of diagnosis when using vignettes may not generalise to more dynamic and interactive virtual social situations. The use of virtual reality uniquely allowed for testing such complex questions. However, it must be noted that in the present study written vignettes were combined with virtual characters and so future research is required to make comparisons between the media. As exposure to information-based learning about mental health can reduce stigma, these results must be interpreted with caution as the sample consisted of college students with a large cohort of psychology and social science majors [21]. Additionally, the sample reported a high level of previous exposure to mental illness, which is shown to reduce stigma and prejudice [22]. However, level of contact and field of study were balanced across groups in this study. Future research can explore this question by recruiting diversified samples. It is also possible that the results may be driven by the character design; the human likeness of the character may not have been high enough to trigger a strong response, due to an uncanny valley effect [23,24]. The present methodology offers a way to bypass the ethical concerns that prevent stigma research exploring reactions to real people with a clinical diagnosis by utilizing an interactive virtual character [25]. However, the present study is limited in the way it used measures of general stigma towards depression rather than measures that assess specific attitudes towards the character in the study. It is however noted that the potential for social expectancy to exacerbate stigmatising attitudes should be considered in a character centered design [26,27]. Consideration of the uncanny valley also increases in importance when focusing on a character centric research design [23]. Future work should investigate the underlying cognitive and affective mechanisms that contribute to the manifestation of stigma, such as social cognitive processes.

References