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Manual Content Analysis of Online Customer Reviews on Wearable Technologies for the Treatment of Body-Focused Repetitive Behaviours

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Keywords

Body-focused repetitive behaviours; wearable electronic devices; manual content analysis; online customer reviews

Abstract

Aim: To better understand the real-world impact that wearable technologies with vibration feedback are having on the treatment of body focused repetitive behaviours (BFRBs). **Materials and Methods:** A manual content analysis was performed on 173 Amazon, Google Play, and Apple reviews, collected from September 2016 to September 2023, on 3 wearable technologies designed to treat BFRBs: 1. Habit Aware Keen (versions 1 and 2), 2. Slightly Robot, and 3. Face Touch Aware. **Results:** 96 % of all clinical commentary was positive. The most frequent endorsements were 1. symptomatic improvement, 2. increased awareness of BFRBs throughout the day, and 3. rapid symptom reduction. 8 % of clinical commentary reported complete remission of BFRBs. **Conclusion:** Our findings suggest that wearable technologies are being favourably adopted by the public to treat BFRBs. This treatment approach offers a unique advantage over traditional behaviour modification therapies, which have been limited by lack of trained therapists and cost.

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Introduction

Body-focused repetitive behaviours (BFRBs) are compulsive behaviours such as hair-pulling, skin-picking, nail-biting, and face-touching that affect not only physical appearance but can also cause injury [1]. BFRBs are commonly seen in patients with obsessive-compulsive spectrum disorders and affect up to 4% of the general population [2]. While most BFRBs are subclinical, approximately 12 % are pathological and cause significant psychological distress or even functional impairment [3].

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The current standard of care for BFRBs is behaviour modification therapy such as habit reversal training (HRT) [4]. HRT is a type of cognitive behavioural therapy comprised of several components including (1) self-monitoring: having patients document each time they engage a BFRB throughout day, (2) awareness training: helping patients become more cognizant of when and why they engage their BFRBs along with any emotional triggers, (3) competing response training: using strategies such as sitting on one's hands during BFRB urges, and (4) stimulus control practices: training patients to identify and avoid locations or situations that provoke BFRBs [4]. A meta-analysis of 18 studies comprising 575 total participants with BFRBs found that HRT has a large overall effect size of 0.8. [5]. Unfortunately, HRT is limited by a lack of trained therapists and cost, which hinders accessibility to treatment [6].

More recently, novel wearable technologies and applications that implement vibration feedback have been developed to help users become more aware of and reduce BFRBs in real-time. These products include HabitAware Keen (versions 1 and 2), Slightly Robot, and Face Touch Aware [7,8]. While these products have been available to consumers since 2015, there is limited data on their effectiveness, utilization, or reception by the general public. To address this gap in knowledge, we performed a manual content analysis of customer reviews collected from Amazon, the Apple Store, and Google Play to better understand the real-world impact that wearable technologies are having on BFRB treatment.

Materials and Methods

Using a qualitative process adapted from Erlingsson and Brysiewicz [9], a manual content analysis was performed on Amazon, Google Play, and Apple reviews, collected from September 2016 to September 2023, on 3 wearable technologies: 1. Habit Aware Keen (versions 1 and 2), 2. Slightly Robot, and 3. Face Touch Aware. To start, all reviews were read and then re-read to generate impressions of the entire dataset. From this exercise, three general themes became apparent: 1. product themes specific to device hardware or software, 2. clinical themes related to BFRB symptoms, and 3. suggestions for improvement.

Once themes were identified, reviews were divided into excerpts termed meaning units containing information pertinent to one of the three themes. The meaning units for each theme were then grouped according to similarity in content, from which, insights from customers emerged that were codified by C.M, J.C.H., and P.D.P. into a codebook.

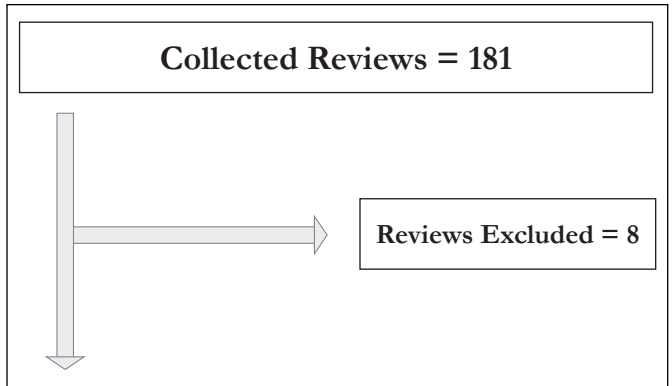
Two teams of three (C.M., N.D.G., N.S.N and J.C.H, A.J.M., R.A.S.) used the codebook to examine each review and assign pertinent codes. Once both teams finished assigning codes for every review, they compared their code assignments to ensure consistency. Any discrepancies in code assignments were discussed and reconciled with a seventh team member P.D.P. Once consensus was met, there was one finalized set of codes for every review. Across all reviews, assigned codes were quantified and organized by frequency.

Results

A total of 181 reviews were collected from Amazon (n = 92), Google Play (n = 47), and the Apple Store (n = 42). Eight reviews were excluded for being unintelligible (n = 3) or irrelevant (n = 5). Of the 173 included reviews, 142 were written on HabitAware Keen (versions 1 and 2), 20 on Slightly Robot, and 11 on Face Touch Aware. A total of 465 codes were assigned to the 173 included reviews. 238 codes pertained to product themes, 199 to clinical themes, and 28 were suggestions for improvement (Figure 1).

Product Themes

Ten codes related to product themes were defined and categorized as either positive or negative. Sixty-one percent of all assigned product codes were negative. The most frequent complaints were 1. difficulty with application set up or use, 2. false positive vibrations, and 3. price. The most appreciated features included 1. a user-friendly



	HabitAware Keen 1&2	Slightly Robot	Face Touch Aware
Reviews	**142**	**20**	**11**
Codes	**398**	**42**	**25**
Product	213	16	9
Clinical	164	19	16
Suggestions for lmprovement	21	7	0

Figure 1. Flow Chart of Collected Reviews and Codes

Table 1. Product Codes, Definitions, and Frequencies

Codes	Definitions	N (% of 238 Codes)
Positive		
User-Friendly	Customer reported that the product works as described, connects seamlessly to smartphone, and/or registering movements is simple	34 (14%)
Supportive Customer Service	Customer reported high-quality customer service	22 (9%)
Customizable	Customer reported that vibrations can be successfully tailored to specific BFRBs	14 (6%)
Youth-Friendly	Customer reported that the device was effective far youth (i.e. parent describing successful use on a child)	13 (5%)
Discrete Design	Customer reported that the product does nat draw visible attention and/or the vibration is only noticeable to the user	10 (4%)
Negative		
Software Issues	Customer reported difficulty with application set up and/or use	54 (23%)
False Positive Vibrations	Customer reported false positive vibrations during non-registered movements (i.e. driving, eating, etc.)	43 (18%)
Expensive	Customer reported that the product was too costly	23 (10%)
Hardware lssues	Customer reported hardware issue with the device (i.e. buttons nat working, uncomfortable strap, battery malfunction)	18 (8%)
Weak Vibration	Customer reported that the vibration strength was inadequate	7(3%)

interface, 2. supportive customer service, and 3. the ability to tailor vibrations to specific BFRBs (Table 1).

Clinical Themes

Seven codes related to clinical themes were defined and categorized as either positive or negative. Ninety-six percent of all assigned clinical codes were positive. The most frequent endorsements were 1. symptomatic improvement, 2. increased awareness of BFRBs throughout the day, and 3. rapid symptom reduction. Only 4 % of clinical codes reported no symptomatic improvement (Table 2). Of the reviews that commented on the time course of BFRB symptom reduction, 87 % endorsed

Table 2. Clinical Codes, Definitions, and Frequencies

Codes	Definitions	N (% of 199 Codes)
Positive		
Symptomatic lmprovement	Customer reported improvement in BFRB(s)	72 (36%)
Increased Awareness	Customer reported greater awareness of their BFRB(s)	54 (27%)
Rapid Symptom Reduction	Customer reported success in reducing BFRB(s) in less than 2 months	28 (14%)
Superior to Previous Treatments	Customer reported superior t reatment results with product compared to other modalities (i. e. talk therapy, medications, fidget gadgets, etc.)	18 (9%)
Complete BFRB Remission	Customer reported complete remission of BFRB(s)	16 (8%)
Useful Adjunct	Customer reported that the device was a useful adjunct to other treatments (i.e. talk therapy, medications, etc.)	4 (2%)
Negative		
No Symptomatic lmprovement	Customer reported no benefit from the device	7 (4%)

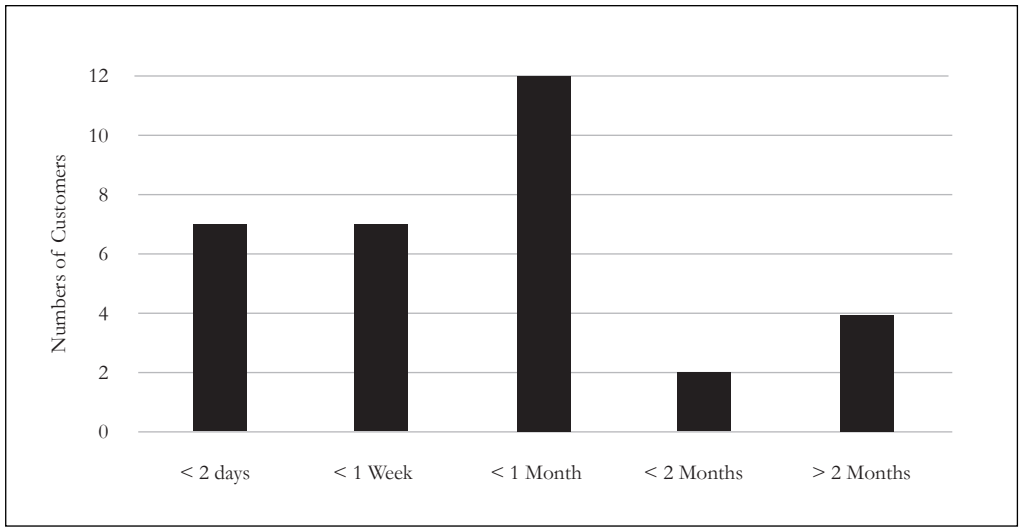


Figure 2. Time Course of BFRB Symptom Reduction

improvements within 2 months of product use (Figure 2). Of the reviews that mentioned the type of BFRB being treated, hair-pulling was most common at 65%, followed by skin-picking (12 %), face-touching (12 %), nail-biting (7 %), and multiple (4%) of the above.

Suggestions for Improvement

Eight suggestions for improvement were codified. The most frequent suggestions included 1. dual wrist functionality, 2. additional data analysis, and 3. a note-taking feature (Table 3).

Online ratings

Across all surveyed sources of reviews, the average rating for HabitAware Keen products was 3.4/5.0 (n = 142), Slightly Robot was 4.2/5.0 (n = 20), and Face-Touch Aware was 4.9/5.0 (n = 11).

Discussion

The preponderance of positive clinical codes suggests that wearable technologies are being used to effectively treat BFRBs. Customers often attributed their clinical improvement to the real-time vibration feedback these devices provide, which allowed them to

Table 3. Suggestions for lmprovement

Codes	Definitions	N (% of 28 Codes)
Dual Wrist Functionality	Customer requested ability to pair a second device far dual wrist functionality	12 (4 3%)
Data Analysis	Customer requested additiona l data analysis (i.e. freq uency of BFRB(s), change with time , correlation w ith mood, etc.)	5(18%)
Note-Taking	Customer requested a note -tak ing feature in the app	3 (10%)
Single Apparatus	Customer requested that the device and strap be manufactured as a single apparatus	2 (7%)
Increased Customizability	Customer re quested additiona l BFRB motions to be captured	2 (7%)
Emoji/Picture Customization	Customer requested ability to change emoji feedback and pictures in the app	2 (7%)
Alarm Clock	Customer re quested an integ rated alarm clock feature	1 (4%)
Dark Mode	Customer requested option to v iew app in dark mode	1 (4%)

more consciously control their impulses. This offers a unique advantage over current standard-of-care treatments, which are typically conducted on a weekly basis [10]. Furthermore, the accessibility of these devices offers an additional advantage compared to the limited number of mental health providers trained to treat BFRBs [6].

However, these devices are not without issue. Many negative code assignments pertained to hardware and software issues, particularly problems with application setup and false positive vibrations that interfered with daily activities. Fortunately, these issues can likely be overcome with improvements to the operating system that incorporate graphical processing units and neural networks to enhance real-time spatial localization [11,12]. While some customers raised concerns about cost, these devices and applications are generally more affordable than weekly therapy sessions [13].

Several reviews also provided suggestions for future improvements. The most common request was for dual-wrist functionality to help prevent both hands from engaging in BFRBs. Enhanced data analysis and a note-taking feature were also suggested so that users could track their BFRBs over time and record their mood. Customers felt these additions would further enhance awareness, inform treatment planning, and improve outcomes.

One limitation of this analysis is that online reviews are not always verified, making it difficult to distinguish between authentic and fabricated feedback. For instance, companies may purchase positive reviews to boost ratings, or competitors may post negative ones to diminish product appeal [14]. Nonetheless, most online reviews are genuine and remain a valuable source of user insight [15]. Taken together, our findings suggest that wearable technologies are being favourably adopted by the public and providing greater accessibility to effective BFRB treatment, though device functionality and features can still be improved.

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Conflict of interest

None to declare.

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