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An Overview of Cybersickness Self-Report Measures for use in Defence Research and Development Canada Experiments

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Reference Document

DRDC-RDDC-2022-D063

June 2022

Canada

IMPORTANT INFORMATIVE STATEMENTS

This document was reviewed for Controlled Goods by Defence Research and Development Canada (DRDC) using the Schedule to the *Defence Production Act*.

Endorsement statement: This publication has been published by the Editorial Office of Defence Research and Development Canada, an organization of the Department of National Defence of Canada. Inquiries can be sent to: Publications.DRDC-RDDC@drdc-rddc.gc.ca.

Update notice: Updates have been made to this version of the report in March 2024, pages 3, 4, and 16.

Abstract

Cybersickness is defined as feelings of malaise similar to motion sickness, arising from the use of extended reality (xR) head-mounted displays (HMDs). xR HMDs are known to cause cybersickness when used extensively. This Reference Document provides researchers conducting experiments using xR HMDs and virtual environments with information on current cybersickness self-assessments. We provide brief summaries on the administration, scoring and reporting of the most widely used self-report measures in the literature and outline methods for data analysis for these self-assessments.

Résumé

Le cybermalaise se définit comme une sensation de malaise semblable au mal des transports, résultant de l'utilisation de visiocasques de réalité étendue (XR). Ceux-ci peuvent provoquer le cybermalaise lorsqu'ils sont utilisés de manière intensive. Le présent document de référence fournit aux chercheurs réalisant des expériences à l'aide de visiocasques de réalité étendue et d'environnements virtuels des renseignements sur les autoévaluations actuelles du cybermalaise. Nous présentons de brefs résumés sur l'administration, la notation et la production de rapports sur les mesures d'autoévaluation les plus largement utilisées dans la littérature. Nous décrivons également les méthodes d'analyse des données pour ces autoévaluations.

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1 Introduction

Extended reality (xR) head-mounted displays (HMDs) have proliferated the defence, entertainment, e-commerce, retail, gaming, education, planning, aerospace, automotive, mining and healthcare industries. Despite the popularity, potential and accessibility of xR HMDs, the presence of symptoms resembling motion sickness poses a serious limitation for the widespread application of these technologies. Though definitions of cybersickness and visually induced motion sickness (VIMS) vary in the literature, we define cybersickness as a form of motion sickness caused specifically by the use of xR HMDs [1], [2], [3]. VIMS is another form of motion sickness occurring from world-fixed virtual environments such as 2-dimensional and 3-dimensional monitors. Like many, the Canadian Armed Forces (CAF) are cautiously optimistic for the gradual adoption of xR HMDs for training and operations. To improve our understanding and ability to prevent or mitigate cybersickness while using xR HMDs, Defence Research and Development Canada (DRDC) must be able to detect and assess cybersickness occurrence when using xR HMDs even in circumstances where cybersickness is not the primary research focus. Many reports on sickness assessment make brief or no mention at all about their administration, scoring and data analysis. The objective of this report is to provide brief summaries of the most widely used self-report sickness measures. This report provides an overview of the administration of current cybersickness self-assessments and provides a guide to data analysis methods to inform DRDC research related to xR HMDs.

We define AR, VR, MR, xR, noting the differences between them. The definitions are adapted from the literature [4], [5], [6], [7]:

Augmented Reality (AR). In AR, virtual graphics is overlaid onto the physical world.

Virtual Reality (VR). In VR, virtual graphics completely occlude the physical world.

Mixed Reality (MR). MR integrates graphics with physical properties of the physical world, allowing interactive and integrated use of graphics.

Extended Reality (xR). xR is an umbrella term encompassing VR, AR, and MR technology.

Physiological measures have been repeatedly applied in an attempt to objectively measure motion sickness [2]. Incidence of vomiting, gastric activity, respiration rate, brain activity and stress have had moderate success at indicating the presence of cybersickness [2], [8], [9], [10], [11]. In contrast, the use of self-report questionnaires has reliably shown to be the most direct and informative approach for indexing an individual's sickness from HMD and virtual environment exposure [2], [12], [13]. Moreover, cybersickness and VIMS can elicit a wide range of responses and symptoms that may not be fully or precisely captured in physiological data. In addition, the use of physiological data to assess sickness has been used experimentally, where results continue to be correlated against self-reported questionnaire data. Feelings of distress assessed through behavioural measures, such as questionnaires, are important for the purposes of evaluating performance associated with individual feelings of sickness—a critical consideration for CAF operations [2]. There is therefore agreement in the current literature that cybersickness is most reliably measured from self-rated measurement [9], [14].

Assessments of sickness are originally derived from work on motion sickness, as the associated symptoms are similar [15], [16]. However, some studies show that cybersickness is associated with more oculomotor discomfort, and less nausea compared to motion sickness and simulator sickness [8], [16]. Stanney et al. [17] showed that cybersickness caused severe disorientation, and is overall, more severe than simulator sickness [17], [18]. Due to the generalities in symptom profiles across these distinct types of sickness, literature surrounding the assessment of simulator sickness, motion sickness, cybersickness and VIMS has often overlapped where similar metrics are used for sickness assessment [15]. These measures are typically classified as either current-sickness state assessments, or susceptibility assessments (i.e., participant history). We explore the most relevant self-report assessments in the literature for both sickness state and sickness susceptibility below.

2 Sickness State Assessments

Sickness state assessments record an individual's present level of sickness. These questionnaires are typically presented to participants repeatedly, throughout exposure to a sickness-inducing stimulus or soon after exposure.

2.1 Simulator Sickness Questionnaire (SSQ)

The simulator sickness questionnaire (SSQ) is a self-report questionnaire consisting of 16 items (i.e., symptoms) originally intended to determine sickness in pilots when using military flight simulators [19]. Today, it continues to be the most well-known, used, and cited self-report questionnaire for sickness assessment in virtual environments and xR HMDs [2], [9]. Each of the 16 items on the SSQ is rated by participants on a four-point Likert scale ranging from *not at all* to *severe*. The items on the SSQ are classified into three non-mutually exclusive subscales of *oculomotor discomfort* (O), *disorientation* (D), and *nausea* (N). Concerns with the validation of the SSQ in a military simulator context have resulted in various attempts to develop new measures of sickness. However, the SSQ remains the most widely used measure [2], [20], [21].

2.1.1 Administration of the Simulator Sickness Questionnaire

There is no definitive consensus on whether the SSQ should be administered as an *absolute* measure, to be used once after stimulus exposure, or a *relative* measure administered repeatedly throughout exposure to the technology in question (e.g., simulator, display, vessel). Arguments for using the SSQ as a relative and absolute measure are presented in the literature. Originally, the SSQ was intended to be a post-exposure metric, as it has been argued that its repeated use could prime participants and yield inaccurate scores [2], [12], [19]. However, many researchers have used the SSQ as a relative measure—where it is administered pre-exposure and at multiple intervals post-exposure; especially for within-subject experimental designs [21], [22], [23], [24]. Repeated administration of the SSQ in an experiment allows for indexing the gradual progression of sickness in an individual over time and/or exposure. This is important as many studies have shown that time is a strong moderator of sickness severity [25], [26], [27], [28]. It has become common place to use the SSQ as relative measure of sickness. A systematic review determined that approximately in 300 papers assessing sickness in virtual environments, 119 (39%) administered the SSQ pre-exposure and post-exposure, while 190 (61%) strictly administered the SSQ post-exposure [21].

The SSQ is administered in either a paper format, electronically, or through an audio recording [29]. While some studies have administered the SSQ verbally [16], [30], it is generally accepted that the SSQ should be completed by participants and not verbally to reduce demand characteristics [19]. Researchers may consider explaining the definition of some items on the SSQ, if warranted.

2.1.2 Scoring of the Simulator Sickness Questionnaire

The ratings of *none*, *slight*, *moderate*, and *severe* for each item are assigned numbers from 0–3, respectively. Participants are asked to assign a score from 0–3 for each of the sixteen items on the SSQ. Scoring of the SSQ is computed as either a *Total Score* (*TS*) or in three subscale scores for *nausea* (N), *oculomotor discomfort* (O), and *disorientation* (D). The symptoms that comprise each subscale are demonstrated in Table 1.

Table 1: *Scoring of the SSQ adapted from Walter et al. [31].*

SSQ Item	Nausea (N)	Oculomotor Discomfort (O)	Disorientation (D)
1. General discomfort	1	1	
2. Fatigue		1	
3. Headache		1	
4. Eyestrain		1	
5. Difficulty focusing		1	1
6. Increased salivation	1		
7. Sweating	1		
8. Nausea	1		1
9. Difficulty concentrating	1	1	
10. Fullness of head			1
11. Blurred vision			1
12. Dizzy (eyes open)			1
13. Dizzy (eyes closed)			1
14. Vertigo			1
15. Stomach awareness	1		
16. Burping	1		
Total	[N]	[O]	[D]

A subscale score is determined as the sum of its symptom scores multiplied by a constant (Table 2). In other words, the individual item severity scores that make up a particular subscale are summed together and multiplied by a constant scaling factor [19]. The *TS* is computed as the weighted average of the three subscales—determined as the sum of the *raw* subscale severity scores multiplied by a constant value (Table 2). It is important to note that subscale and *TS* calculations are often misinterpreted where the *TS* is calculated using the weighted subscale scores rather than the raw scores—this is incorrect and could lead to serious overestimations of sickness severity.

Table 2: *Calculation of SSQ scores.*

SSQ sub-scales	Calculation
Nausea (N)	[N] x 9.54
Oculomotor Discomfort (O)	[O] x 7.58
Disorientation (D)	[D] x 13.92
Total (*TS*)	([N] + [O] + [D]) x 3.74

The highest possible *TS* is ~ 300. A higher *TS* is associated with increased sickness severity [9], [19], [30]. In the current literature, the reporting of SSQ results varies greatly with some papers presenting a complete representation of all raw subscale scores and the *TS*. It is suggested that researchers report all descriptive statistics for all subscales as well as the *TS* [14]. The complete reporting of SSQ data will allow detailed insight into the intervention and subsequent symptom profiles [10]. It is also worth providing difference scores in assessments of pre- and post-sickness to eliminate potential sources of sickness that were present before virtual environment exposure. A primary analysis of sickness scores from the SSQ can be presented in direct comparison to other simulators or virtual environment devices as *TS* or subscale scores [30]. The methodology used to analyze ordinal data, such as the SSQ, is addressed in Section 4 of this report.

2.2 Virtual Reality Sickness Questionnaire (VRSQ)

Researchers have argued that the use of the SSQ is not ideal for measuring sickness from xR HMDs and virtual environments because of the difference in symptom profiles between simulators and virtual environment systems [16]. As some studies have shown that cybersickness is associated with increased oculomotor discomfort [8], [16], a modified SSQ was developed with the intention to be specialized for the HMD environment (e.g., VR) named the virtual reality sickness questionnaire (VRSQ) [8]. However, it is important to note that there is still disagreement on exact symptom profiles between cybersickness and other types of sickness [17], [18]. In the VRSQ, the *nausea* subscale of the SSQ is removed, and the remaining items within the *oculomotor discomfort* and *disorientation* subscales are re-categorized to produce two mutually exclusive subscales. As such, the VRSQ has 9 items in contrast to the 16 for the SSQ [8].

2.2.1 Administration and Scoring of the Virtual Reality Sickness Questionnaire

The VRSQ is intended to be administered as a post-exposure measure of sickness like the SSQ [1], [8]. Participants are asked to assign a severity score (*none*, *slight*, *moderate*, *severe*) to each of the nine items on the VRSQ as would be done with the SSQ. The severity scores are assigned values from 0–3, respectively.

The calculation of scores from the VRSQ is different from the SSQ. Individual items from each subscale are summed together and multiplied by a scaling factor (Table 3). The *Total Score* is then determined as the average of the *oculomotor discomfort* and *disorientation* scores. As some studies have shown that nausea is less prevalent in cybersickness compared to other forms of MS, there is an increased emphasis on *oculomotor discomfort* and *disorientation* in the VRSQ; thus, fewer items overall for participants to respond to when compared to the SSQ. However, the VRSQ is not widely used and therefore may pose difficulty for validating findings against other studies that have also used the VRSQ.

Table 3: *Calculation of VRSQ scores.*

VRSQ subscales	Calculation
Oculomotor Discomfort (O)	(Sum of (O) Scores / 12) * 100
Disorientation (D)	(Sum of (D) Scores / 15) * 100

2.3 Fast Motion Sickness Scale (FMS)

The fast-motion sickness scale (FMS) is a brief self-assessment rating used to obtain a measure of sickness during stimulus presentation—completed verbally by participants [10]. This contrasts with the SSQ, which is more extensive and requires participants to complete the assessment post-exposure [10], [19]. The FMS is a single, verbal self-assessment scale ranging from zero (*no sickness*) to 20 (*frank sickness*). Initially developed to assess MS, the FMS has consistently been used in experiments related to VIMS [32], [33].

2.3.1 Administration and Scoring of the Fast Motion Sickness Scale

The FMS was originally designed to be administered every minute [10], [34], but has since been administered more loosely [35]. Participants are simply asked to rate their sickness on a 0–20 scale, at pre-determined time intervals (Table 4). If participants drop out of the experiment due to sickness, the experimenter can use the last reported FMS score is used to score all subsequent ratings for that participant [10], [36].

The FMS has been validated to correlate highly with SSQ subscale scores and the *TS* (up to $r = 0.80$) [10], [35], [36]. It is useful in situations requiring timely records of sickness, where a paper-questionnaire may not be appropriate during an experimental condition. Brief scales, such as the FMS, have been used in MS experiments in the past, often as a general representation of sickness where researchers are either not particularly interested in sickness and just want to obtain a measure of it during exposure, or prefer not to prime participants with a predefined list of symptoms [35], [37]. The FMS may also be used alongside the SSQ to conduct comparisons of sickness related to time exposure.

Table 4: *Example scoring of the FMS for 1-minute assessment interval.*

Exposure Time:	0 min	1 min	2 min	3 min	4 min	5 min	6 min
FMS Score (0–20):							

3 Sickness Susceptibility Assessments

The previous section explored sickness-state assessments used during experimentation. However, some assessments are used to quantify an individual's susceptibility to sickness. A well-known example of this is the motion sickness susceptibility questionnaire (MSSQ). These types of assessments may be useful for researchers to screen out individuals likely to be sick in an experiment before they participate. Sickness susceptibility assessments often correlate with sickness-state assessments and can therefore confirm those results [14], [38].

3.1 Motion Sickness Susceptibility Questionnaire (MSSQ)

The MSSQ assesses susceptibility to motion sickness based on past experiences [38]. Consisting of 18 items, it is a shortened version of the original 54-item MSSQ-long. The MSSQ requires participants to report general sickness history as a child (before the age of 12) and as an adult (within the last 10 years) when using different modes of transportation (e.g., car, boat, aircraft).

In the examination of motion sickness during micro-gravity parabolic flights to assess air sickness, Golding et al. [39], [40] administered the MSSQ verbally pre-exposure, determining that lower scores were associated with less sickness based on a verbal motion sickness scale. Despite primarily focusing on sickness associated with transportation and motion, the MSSQ has been validated to predict sickness provoked from the use of virtual environments (i.e., VIMS and cybersickness) [38], [39]. The MSSQ is highly cited and is commonly used to make predictive determinations of how likely an individual is to experience sickness, based on previous episodes.

3.1.1 Administration of the Motion Sickness Susceptibility Questionnaire

Prior to stimulus exposure, participants are asked to complete both Part A (i.e., history of experiencing motion sickness as a *child*) and Part B (i.e., history of experiencing motion sickness as an *adult*) of the MSSQ. The MSSQ can be administered in either an electronic or paper format [38]. For each mode of transportation listed on the MSSQ, participants tick the box describing how often they felt sick or nauseated on a 5-point scale (e.g., *N/A*, *Never*, *Rarely*, *Sometimes*, and *Frequently*) (Table 5) [38].

Table 5: *MSSQ example for one transportation type.*

Cars	**Not Applicable—Never Travelled (*t*)**	**Never Felt Sick (*0*)**	**Rarely Felt Sick (*1*)**	**Sometimes Felt Sick (*2*)**	**Frequently Felt Sick (*3*)**

3.1.2 Scoring of the Motion Sickness Susceptibility Questionnaire

The MSSQ consists of the MSA and MSB [38]. The number of transportation types *not experienced* ('*N/A*' column) is summed together and used to weigh scores relative to the number of transportation types that *are* experienced; separate for the MSA and MSB, respectively. The maximum score for column *t* (types *never* travelled) is 9. The sickness scores for each mode of transportation are calculated using the scoring makers (Table 6). A number from 0–3 is assigned to *never felt sick*, *rarely felt sick*, *sometimes felt sick*, and *frequently felt sick*, respectively [38], [40]. The raw total sickness score for each part is then computed as the sum of scores across each transportation type experienced.

The MSA and MSB score is then determined through a weighted calculation to ensure that scores only consider motion types that *have been* experienced (Table 6). It is not possible to determine a susceptibility score in absence of any relevant motion exposure [38]. Finally, the MSSQ score is the sum of both the MSA and the MSB scores—the maximum possible score is 54. Higher scores are indicative of a stronger susceptibility to sickness [40].

Table 6: *Calculation of MSSQ scores.*

MSSQ Components	Calculation
Motion Sickness A (MSA)	(Score A x (9)) / (9–# of types *not* experienced)
Motion Sickness B (MSB)	(Score B x (9)) / (9–# of types *not* experienced)
Total	MSA + MSB

3.2 Visually Induced Motion Sickness Susceptibility Questionnaire (VIMSSQ)

The visually-induced motion sickness susceptibility questionnaire (VIMSSQ) was developed as a modified version of the MSSQ specifically for VIMS [13]. The VIMSSQ requires participants to rate their past experience of sickness from use of visual devices. This contrasts with the MSSQ that assesses general sickness severity against transportation types. The developers of the VIMSSQ suggest that the questionnaire should be used in conjunction with the MSSQ to increase its predictive power [40].

3.2.1 Administration of the Visually Induced Motion Sickness Susceptibility Questionnaire

Participants are asked to circle the frequency of experiencing five symptoms for common visual displays including smartphones, movie theatre screens, video games, tablets and HMDs (Table 7). The VIMSSQ is administered prior to virtual environment exposure [13], [40]. In addition, the VIMSSQ catalogues devices that respondents should avoid based on their reports of discomfort using them.

Table 7: *Representation of the VIMSSQ.*

Symptom	Classification			
Nausea	*Never*	*Rarely*	*Sometimes*	*Often*
Headache	*Never*	*Rarely*	*Sometimes*	*Often*
Dizziness	*Never*	*Rarely*	*Sometimes*	*Often*
Fatigue	*Never*	*Rarely*	*Sometimes*	*Often*
Eyestrain	*Never*	*Rarely*	*Sometimes*	*Often*

3.2.2 Scoring of the Visually Induced Motion Sickness Susceptibility Questionnaire

The scoring of the VIMSSQ follows part of Golding's [38] procedure for calculating MSSQ scores as described above [13], [40]. A number from 0–3 is assigned to *never felt sick*, *rarely felt sick*, *sometimes felt sick*, and *frequently felt sick*, respectively by the researcher. A total score is calculated as the addition of all item scores (i.e., symptoms), providing a minimum score of 0 and maximum score of 18. Higher VIMSSQ scores indicate a greater susceptibility to VIMS [13].

4 Methods for Statistical Analyses of Questionnaire Data

Data from the self-assessment measures presented in this report are non-parametric, ordinal data [41]. Despite this, many studies have employed parametric methods to analyze questionnaire data, such as the SSQ and related sickness assessments. Kennedy et al. [42] employed a one-way analysis of variance (ANOVA) to assess SSQ scores in four separate categories of duration times (0–1 hr.; 1–2 hr.; 2–3 hr.; and 3–4 hr.) in a between-subject design for over 900 data sets of simulator exposure. Further, sickness questionnaire data is typically assessed in a within-subject or between-subjects design. The within-subject analysis is primarily used to analyze temporal variations of sickness, while the between-subjects analysis is normally an assessment of two or more separate conditions [16], [19], [42]. The methods chosen for analysis will depend on the design of the study and data-related constraints. We provide a framework in Table 8 for selecting the appropriate statistical analyses for questionnaire data based on the study design.

Table 8: *Framework for assessment of sickness scale data in various study designs.*

	Parametric:	**Non-parametric:**
Within-subject:		
2 Groups:	Paired T-Test [43]	Wilcoxon Signed Rank Test [15], [44]
≥ 3 Groups:	One-Way Repeated Measures ANOVA [14], [22]	Friedman Test [45]
Between-subject:		
2 Groups:	Independent T-Test [13]	Mann-Whitney U (Wilcoxon Rank Sum Test) [13], [21]
≥ 3 Groups:	One-Way ANOVA [8], [42]	Kruskal-Wallis [43]
Post-hoc:	Tukey HSD, Fisher LSD [46]	Bonferroni Correction, Dunn's Test

4.1 Normality

Non-parametric data are not normal and therefore violates assumptions of normality. It is important to recognize that many studies have employed ANOVAs to non-parametric data such as the scales presented above. Some have justified the use of the ANOVA with these data by arguing that the ANOVA is robust in limiting Type 1 error when sample distributions of values of skewness and kurtosis ranging from -1 to 1, as well as with varying sample-sizes [21], [47].

4.2 Within-Subject

The non-parametric alternative to an ANOVA or t-Test is the Wilcoxon Signed Rank Test (WSRT) and the Friedman Test for within-subject study designs. The WRST is a non-parametric alternative to a one-sample T-Test—typically for a pre and post exposure assessment of sickness [21], [48]. In a U.S. Army study on flight simulators, Hicks et al. [44] used the WSRT to determine significance between pre-flight SSQ and post-flight SSQ. The Friedman test is a non-parametric assessment used for a repeated measure design, such as the temporal assessment of sickness [44].

4.3 Between-Subject

The Mann Whitney U Test (Wilcoxon Rank Sum Test) has been the most common method for assessing equality of means of SSQ data in two independent samples or groups [41]. For instance, Hirzle et al. [21] used the Mann-Whitney-U Test to determine potential differences in SSQ scores between two independent groups with the assumption of a non-normal distribution. Alternatively, the Kruskal-Wallis should be employed to assess research designs with more than two groups [41], [49].

4.4 Further Analyses

Post-hoc assessments can be employed to further investigate multi-group comparisons, (Table 8). Correlational analyses can be used for comparisons between separate questionnaire data. The Pearson's Correlation or the Spearman's Rho can be used for both parametric and non-parametric data sets, respectively [50].

Multivariate analyses for investigations into multiple factors should be performed based on the principles of multivariate statistics. For example, Keshavarz et al. [51] used the Mardia's Test to determine violations of multivariate normality ($p < 0.05$) on VIMSSQ data, and as such conducted a Weighted Least Squares (WLS) estimation method. Ultimately, researchers must do their due diligence in adhering to identified assumptions of assessments such as the ANOVA and provide reasoning for using a particular method of assessment.

5 Recommendations

We provide recommendations on how to navigate the use of sickness questionnaires, their administration, and data analysis as follows:

1. The SSQ is recommended as the primary metric for sickness state assessments of cybersickness and VIMS. For self-assessments of cybersickness and VIMS, the SSQ remains the most widely used measure because a) other questionnaires continue to be validated against the SSQ, and b) the ease of comparisons with other studies because of its ubiquitous use.

2. The FMS is recommended for use in circumstances where the SSQ cannot be completed, or when the researcher is only peripherally interested in participant sickness.

3. The MSSQ is recommended for use in virtual and non-virtual environment studies to determine susceptibility to sickness. The MSSQ can be a means to screen participants from completing a study, or correlating MSSQ data with sickness-state questionnaires and data.

4. Non-parametric methods must be used for ordinal scales for measuring sickness (e.g., SSQ, MSSQ, VIMSSQ, etc.).

5. It is strongly recommended that all descriptive statistics are reported, as well as the individual subscale scores and total scores from all the employed self-assessments.

6 Conclusion

This Reference Document collates the latest and most widely cited research on the topic of assessing cybersickness and VIMS to support DRDC researchers using xR HMDs and virtual environments with self-report measures. The report describes the appropriate use of sickness state and sickness susceptibility assessments, and provides rationale and use cases for each. This Reference Document also addresses how to analyze data from these various self-report measures depending on research designs employed. This Reference Document is meant to be used as a guide by researchers performing research with virtual environments and xR HMDs as it contributes to our understanding of how to quantify sickness in the CAF. Readers should refer to identified references in the text to learn more about cybersickness, VIMS, and associated measures.

Ongoing research may yield an objective means for determining the state of sickness within a participant (e.g., heart rate, temperature, etc.) where one could monitor in real time cybersickness and VIMS. With these objective measures, one can return to parametric methods for analysing resulting data.

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List of Symbols/Abbreviations/Acronyms/Initialisms

ANOVA	analysis of variance
AR	augmented reality
CAF	Canadian Armed Forces
DRDC	Defence Research and Development Canada
FMS	fast-motion sickness scale
HMD	head mounted display
MR	mixed reality
MSA	Motion Sickness A
MSB	Motion Sickness B
MSSQ	motion sickness susceptibility questionnaire
SSQ	simulator sickness questionnaire
VIMS	visually induced motion sickness
VIMSSQ	visually-induced motion sickness susceptibility questionnaire
VR	virtual reality
VRSQ	virtual reality sickness questionnaire
WLS	weighted least squares
WSRT	Wilcoxon Signed Rank Test
xR	extended reality

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*Security markings for the title, authors, abstract and keywords must be entered when the document is sensitive

1. ORIGINATOR (Name and address of the organization preparing the document. A DRDC Centre sponsoring a contractor's report, or tasking agency, is entered in Section 8.)

DRDC – Toronto Research Centre
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1133 Sheppard Avenue West
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3. TITLE (The document title and sub-title as indicated on the title page.)

An Overview of Cybersickness Self-Report Measures for use in Defence Research and Development Canada Experiments

4. AUTHORS (Last name, followed by initials – ranks, titles, etc., not to be used)

Merchant, W., Kirollos, R.

5. DATE OF PUBLICATION (Month and year of publication of document.)	6a. NO. OF PAGES (Total pages, including Annexes, excluding DCD, covering and verso pages.)	6b. NO. OF REFS (Total references cited.)
June 2022	22	51

7. DOCUMENT CATEGORY (e.g., Scientific Report, Contract Report, Scientific Letter.)

Reference Document

8. SPONSORING CENTRE (The name and address of the department project office or laboratory sponsoring the research and development.)

DRDC – Toronto Research Centre
Defence Research and Development Canada
1133 Sheppard Avenue West
Toronto, Ontario M3K 2C9
Canada

9a. PROJECT OR GRANT NO. (If appropriate, the applicable research and development project or grant number under which the document was written. Please specify whether project or grant.)	9b. CONTRACT NO. (If appropriate, the applicable number under which the document was written.)
APW_010	

10a. DRDC PUBLICATION NUMBER (The official document number by which the document is identified by the originating activity. This number must be unique to this document.)	10b. OTHER DOCUMENT NO(s). (Any other numbers which may be assigned this document either by the originator or by the sponsor.)
DRDC-RDDC-2022-D063	

11a. FUTURE DISTRIBUTION WITHIN CANADA (Approval for further dissemination of the document. Security classification must also be considered.)

Public release

11b. FUTURE DISTRIBUTION OUTSIDE CANADA (Approval for further dissemination of the document. Security classification must also be considered.)

12. KEYWORDS, DESCRIPTORS or IDENTIFIERS (Use semi-colon as a delimiter.)

motion sickness; virtual reality; measurements; cybersickness

13. ABSTRACT (When available in the document, the French version of the abstract must be included here.)

Cybersickness is defined as feelings of malaise similar to motion sickness, arising from the use of extended reality (xR) head-mounted displays (HMDs). xR HMDs are known to cause cybersickness when used extensively. This Reference Document provides researchers conducting experiments using xR HMDs and virtual environments with information on current cybersickness self-assessments. We provide brief summaries on the administration, scoring and reporting of the most widely used self-report measures in the literature and outline methods for data analysis for these self-assessments.

Le cybermalaise se définit comme une sensation de malaise semblable au mal des transports, résultant de l'utilisation de visiocasques de réalité étendue (XR). Ceux-ci peuvent provoquer le cybermalaise lorsqu'ils sont utilisés de manière intensive. Le présent document de référence fournit aux chercheurs réalisant des expériences à l'aide de visiocasques de réalité étendue et d'environnements virtuels des renseignements sur les autoévaluations actuelles du cybermalaise. Nous présentons de brefs résumés sur l'administration, la notation et la production de rapports sur les mesures d'autoévaluation les plus largement utilisées dans la littérature. Nous décrivons également les méthodes d'analyse des données pour ces autoévaluations.