

# The metaverse:

## a snapshot of experiences in virtual reality

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December 2023

# eSafety research program

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The eSafety research program supports, encourages, conducts and evaluates research about online safety for Australians. We do this so that:

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## Acknowledgements

We would like to thank the people who participated in this research and gave their time to contribute to a greater understanding of experiences in the metaverse.



### Acknowledgement of Country

eSafety acknowledges all First Nations peoples for their continuing care of everything Country encompasses — land, waters and community. We pay our respects to First Nations peoples, and to Elders past, present and future.

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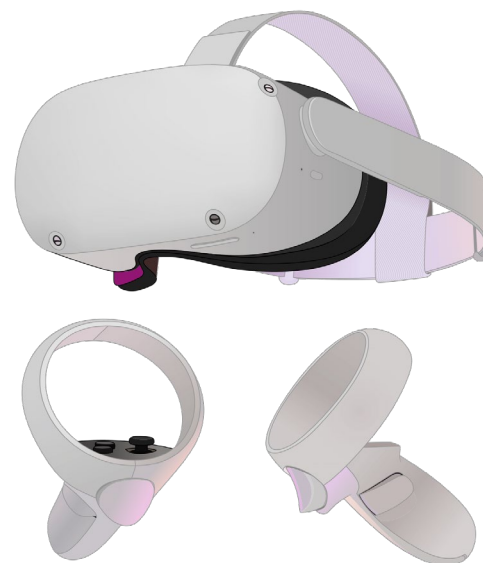
# About this report



**The metaverse<sup>1</sup> can be described as a virtual world where users can interact with each other in a wholly immersive and interactive computer-generated environment. It's a place with endless possibilities: people can play, create, connect and collaborate** (Institution of Engineering and Technology 2022; Marr 2022b); **develop and practise new skills safely and affordably** (Bansal et al 2022; eSafety Commissioner 2020); **or participate in activities and opportunities that may improve their quality of life and independence** (eSafety Commissioner 2020).

However, like many technological developments, the metaverse also creates new risks and has the potential to facilitate harm. Many of the safety, privacy and security harms that occur online will be encountered in the metaverse, including cyberbullying (eSafety Commissioner 2020; Hinduja n.d.), image-based abuse (eSafety Commissioner 2020), desensitisation to antisocial attitudes or behaviours (eSafety Commissioner 2020; Institution of Engineering and Technology 2022), grooming of children for sexual abuse, and addiction (eSafety Commissioner 2020; Reed and Joseff 2022).

**There is growing concern that the impact of these risks and harms may be more pronounced in the metaverse, where virtual experiences and sensations feel more real.<sup>2</sup>**



<sup>1</sup>The technical definition of metaverse used for this study is provided in Appendix B: Glossary of terms.

<sup>2</sup>eSafety Commissioner 2020; Reed and Joseff 2022.

In 2022, eSafety surveyed over 5,000 adults in Australia about their online lives, including their experiences in the metaverse. The findings revealed that a small but significant number of those adults are interacting in the metaverse (and using virtual reality or haptic technologies) – 4% in the previous 12 months. This finding suggests that approximately 680,000 adults in Australia may be engaging in the metaverse (based on calculations using the latest Census data – see Australian Bureau of Statistics 2021, and data from the Australian Digital Inclusion Index: 2023 – see Thomas et al. 2023).

Our research also suggests that many people are likely to be engaging regularly; half (49%) of those identified as metaverse users said they had entered the metaverse at least every month during the previous 12 months. Six in ten metaverse users (61%) indicated they had utilised one or more haptic technologies. Haptic technologies can enhance or intensify experiences in the metaverse by allowing users to feel what is happening in these environments.

**The majority of users (71%) had at least one negative experience in the metaverse.**

Among the most common negative experiences were being left out by other people (23%), being called offensive names (21%), receiving repeated unwanted messages or online contact (16%), and being exposed to inappropriate and unwanted content (13%). In addition, some metaverse users reported being touched in a way they didn't like via haptic technology (9%), while 6% said that other users had created sexually explicit avatars or images of them to interact with without their consent. Many of those who had negative experiences indicated that these had had negative impacts for them; for example, half (49%) reported that there had been detrimental effects on their mental or emotional wellbeing.



**Findings from this research will provide important insights for eSafety's public education and regulatory interventions and inform the development of eSafety's position statements on tech trends and challenges.** They will also be used to shape resources to support industry to build safeguards into the architecture of the metaverse as it is developed and expanded, as part of eSafety's [Safety by Design](#) initiative.



# Defining 'metaverse'

The metaverse is relatively new and constantly evolving. There are different ways to describe it, but one common definition is that it is a virtual world where people can interact with each other through avatars in a three-dimensional space that closely resembles reality (Cambridge University Press n.d.). Others describe the metaverse as a **fully immersive version of the internet** (Marr 2022a).

The virtual environments that make up the metaverse are facilitated by immersive technologies, including **augmented reality (AR), virtual reality (VR) and mixed reality (MR).**



**AR overlays the user's view of the actual world with digitally generated real-time sound and vision.** The combined actual and digital content is usually viewed through a handheld device (e.g. smartphone, tablet etc.) or smart glasses.



**VR uses computer hardware and software to create an artificial environment that looks and sounds as if the user is really present in that space.** VR is typically accessed using VR headsets along with handheld controllers containing sensors to track head and hand movements.

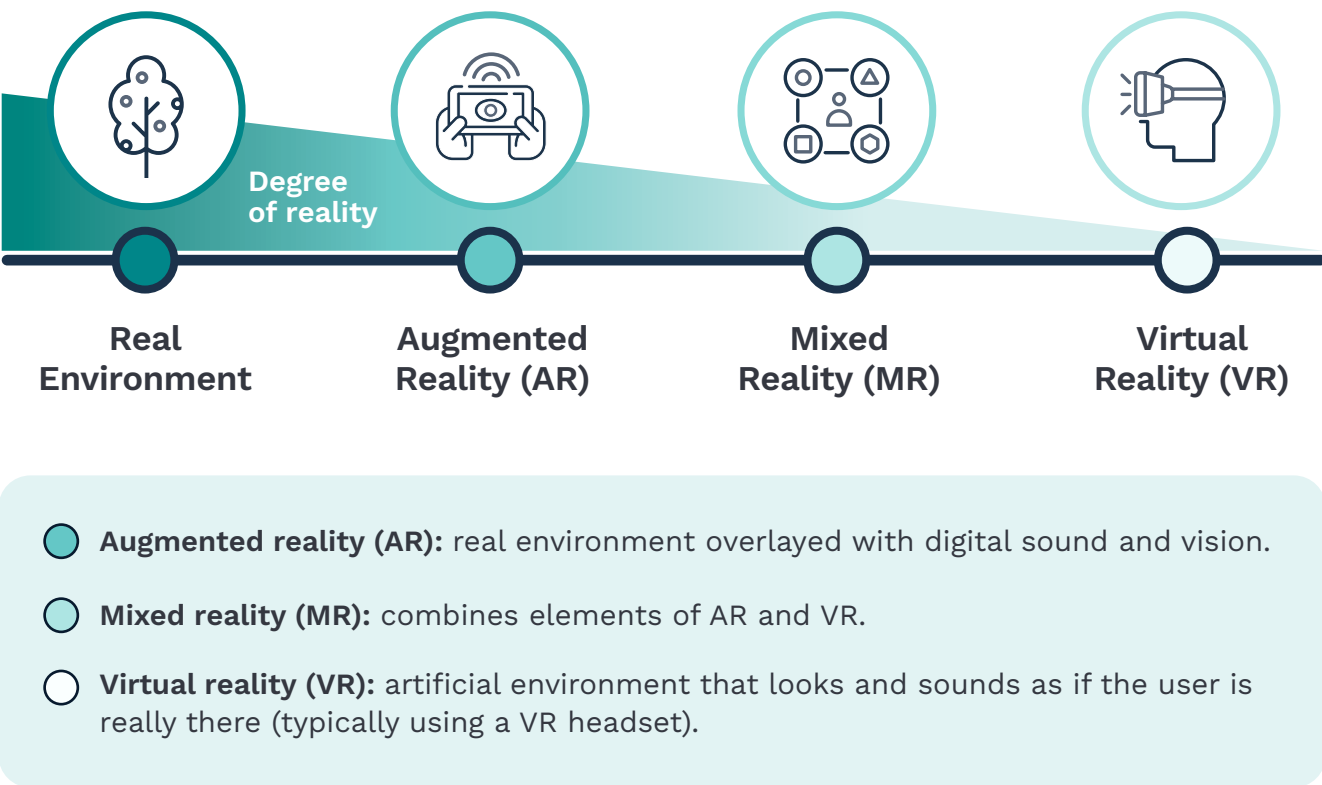


**MR combines elements of both AR and VR.** In MR, digital content blends into the physical environment so that the user sees and hears the virtual elements as an extension of reality. The virtual objects or characters behave as if they are real, interacting with light, sound and space (eSafety Commissioner 2020).

Figure 1 illustrates where each of these technologies sits on the reality–virtuality continuum (Milgram et al. 1994).<sup>3</sup>

<sup>3</sup>The reality–virtuality continuum was developed by Milgram et al. in 1994 to describe the extent to which a participant or observer is immersed in the real world or in a virtual environment.

Figure 1: The reality–virtuality continuum



Source: Adapted from simplified representation of a reality–virtuality continuum in Milgram et al. (1994).

Haptics may be used in combination with AR, MR or VR to enhance the experience of being in the metaverse by providing sensory feedback and allowing the user to ‘feel’ what is happening in the virtual environment. For the purposes of this research, haptics include haptic suits, gloves and backpacks (eSafety Commissioner 2020), although possible future uses also include stimulating taste and smell (Hadero et al. 2023).

The technologies that make up and facilitate access to the metaverse are constantly evolving. According to some definitions, the metaverse will only be fully realised when an unlimited number of users can move freely between virtual environments, in a concept known as ‘interoperability’ (Ball 2021; World Economic Forum 2023). This vision of the metaverse hasn’t yet been achieved. Rather, there are currently many separate virtual environments, known as ‘walled gardens’ (Future Today Institute 2023).

As there is not yet a consistent definition of the metaverse, the potential for confusion around this concept and associated terms should be considered by policymakers, the technology industry, researchers, and others who wish to communicate effectively about these issues.

# Methodology

The eSafety *Australian Adults Online* survey was conducted in November and December 2022. A total of 5,304 adults were surveyed about their online activities and experiences, including 259 who were identified as metaverse users. The reference period for the study was the 12 months prior to November / December 2022.

In this study, we defined the metaverse as:



**A virtual-reality space in which users can interact with a computer-generated environment and other people, while using a VR headset or a device that allows them to feel what is happening in virtual environments, such as gloves, suits or backpacks (i.e. haptics).**

Metaverse users were defined as survey respondents who had interacted with other people using immersive technologies or while in a virtual environment and used a VR headset and/or haptics in a platform or game.

We note that this definition of metaverse users excludes respondents who had only experienced virtual environments on their own without interacting with others. Similarly, respondents who had only experienced AR without the use of haptics or a VR headset (such as through a personal computer, smartphone, tablet or console only) were also excluded.

This approach was taken because many online harms occur due to interactions with others, such as cyber abuse. Additionally, concerns about the metaverse specifically, as opposed to online risks in general, relate to people feeling fully immersed in an alternative reality where experiences feel more ‘real’. This type of immersive experience is more applicable to VR environments and/or to the use of haptics.



## Limitations

Three key limitations should be considered when interpreting the findings of this research.

First, the sample of adults identified as metaverse users is relatively small (n=259). This means that the survey results may vary from the experiences of the entire population of metaverse users in Australia. It also doesn’t allow us to identify which subgroups are more at risk of harm in the metaverse or the impacts of specific experiences in this environment.

Second, analysis of the survey data revealed some contradictions in respondents’ survey responses, suggesting a level of confusion about what the metaverse is. These contradictions were addressed by removing or recoding inconsistent responses. However, this means that some valid responses and experiences may have been removed from the data.

Third, this research focuses on harms that are covered by eSafety’s functions and powers under the *Online Safety Act 2021*, including abusive behaviours and exposure to harmful content online. We note that metaverse users may also be exposed to other types of harm that are not identified in this report, such as fraud, scams, malware and viruses.

More detailed information about the methodology is provided as Appendix A. A glossary of key terms is included as Appendix B. The definitions and examples in the glossary are broadly consistent with those provided to survey respondents.

## Positionality statement

eSafety understands the impact of researchers’ intersecting experiences of power and marginalisation on our research and analysis. The team that authored this report is made up of cis-gender women of European heritage. Identities represented in the team include queer women and those with disability. Our team has expertise in quantitative and qualitative methodologies, online harms and safety issues, and the lived experiences of people at risk of online harms.



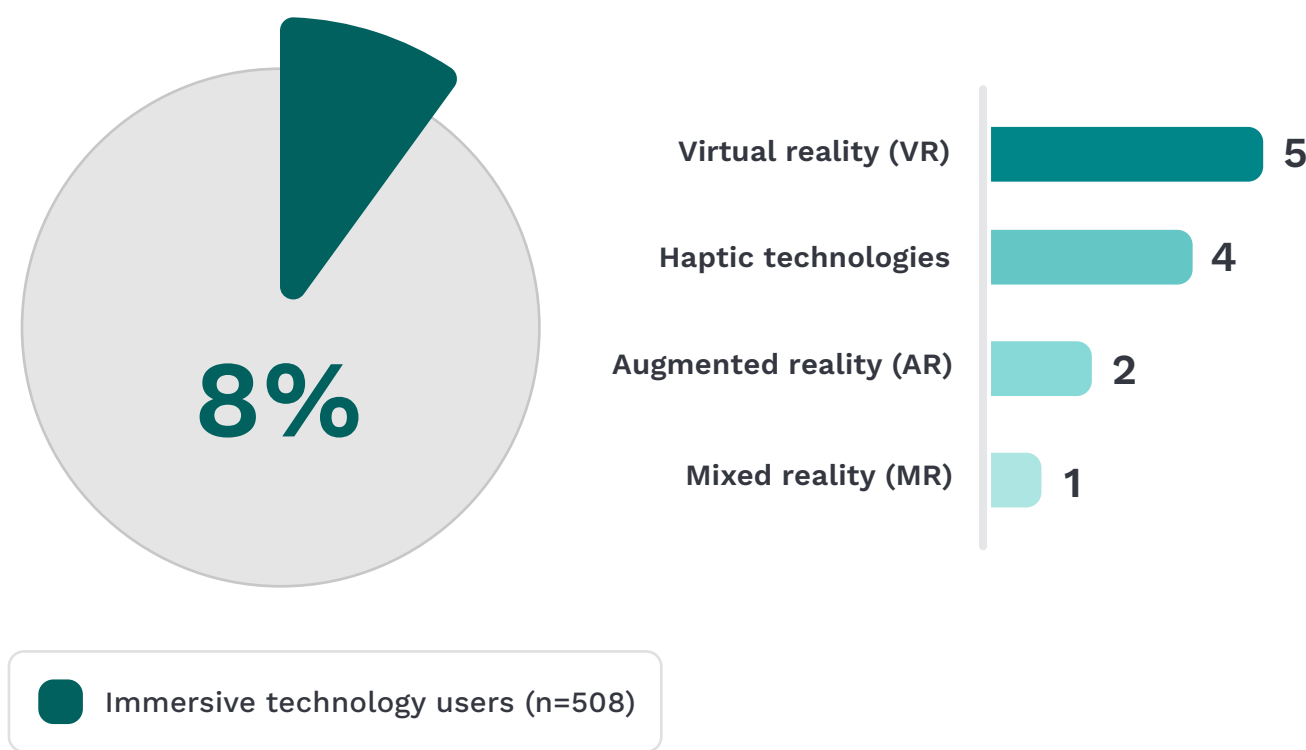
# Findings



1 in 12 adults had used immersive technologies

Of the 5,304 adults surveyed about their online experiences, 8% had used any type of immersive technology (i.e. AR, MR, VR or haptics) in the last 12 months. As shown in Figure 2, the largest proportion of respondents had used VR (5%) and haptics (4%), followed by AR (2%) and MR (1%).

**Figure 2:** Immersive technology users (%)



**Q.** Have you done any of the following on/via the internet in the last 12 months? / Which of the following immersive technologies were you using when you were using the following [games/platforms]?

**Base:** All adults aged 18+ (n=5,304)

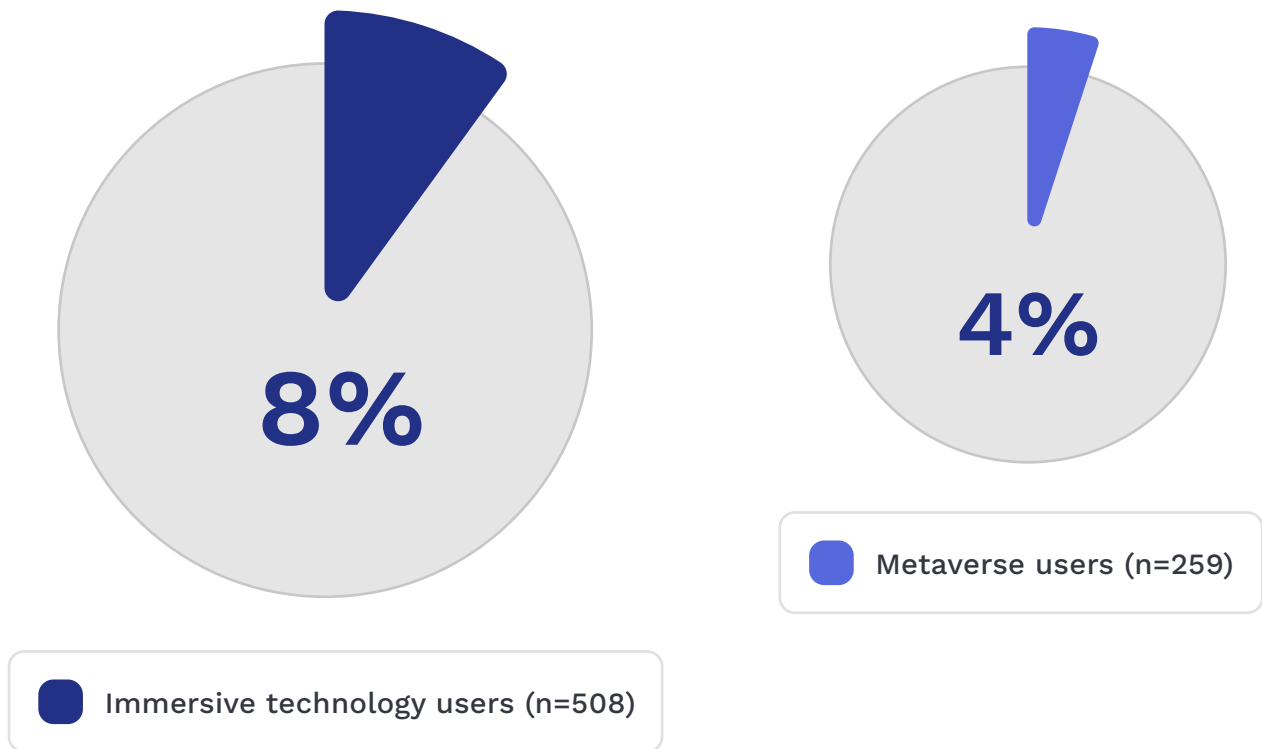


1 in 25 adults were metaverse users

Of the adults surveyed who had used any type of immersive technology (i.e. AR, MR, VR or haptics) in the last 12 months (8%), around half (52%) had interacted with others through using immersive technologies or while in a virtual environment, which equated to 4% of survey respondents.

Further, almost all survey respondents who had used any type of immersive technology and interacted with others through using immersive technologies or while in a virtual environment (94%) had used either a VR headset or haptics in a platform or game. This means that they had been fully immersed in a virtual space. Therefore, 4% of adults surveyed were identified as metaverse users (Figure 3).

**Figure 3:** Immersive technology/metaverse users (%)



**Q.** Have you done any of the following on/via the internet in the last 12 months? / Have you connected online with other users in the metaverse, i.e. interacted with others online through using immersive technologies? / Which of the following immersive technologies were you using when you were using the following [games/platforms]?

**Base:** All adults aged 18+ (n=5,304)



## Metaverse use was more common among younger adults and men

Younger adults and men were more likely than others to have entered the metaverse. Specifically, the majority (75%) of metaverse users were under 40 years old, 16% were aged 40–49, 7% were aged 50–65 and only 1% were over the age of 65. Three-quarters (76%) were men.

The following groups were also over-represented among metaverse users: people who spoke a language other than English at home (40% of metaverse users vs. 19% of the total sample) and people living in metro areas (89% of metaverse users vs. 73% of the total sample).

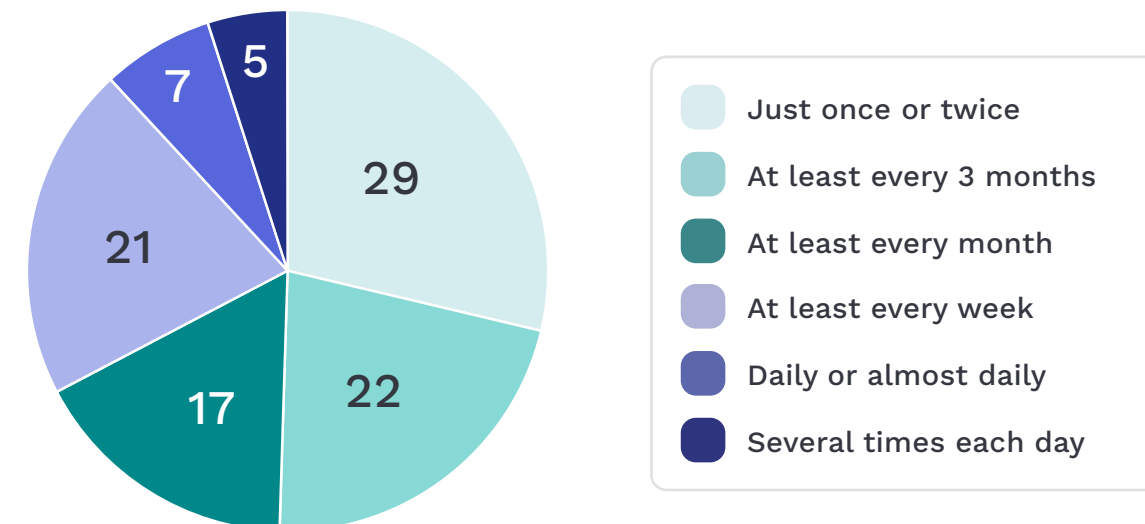


## Most metaverse users had entered the metaverse multiple times

The majority of metaverse users had entered the metaverse multiple times in the last 12 months; 7 in 10 (71%) had done so more than once or twice and almost half (49%) had entered the metaverse regularly (i.e. at least every month). This includes one-third (32%) who had entered the metaverse at least weekly and 1 in 10 (11%) who entered the metaverse daily, or several times a day, as shown in Figure 4.



**Figure 4:** Frequency of metaverse users' entry to the metaverse (%)



**Q.** Over the last 12 months, how often have you entered the metaverse in games/online environments?

**Base:** Metaverse users (n=259)



## Most metaverse users had used haptic technologies

Six in 10 metaverse users (61%) had used one or more haptics. Just over 2 in 5 (44%) had used a haptic suit, and around one-third had used haptic gloves (37%) and/or a haptic backpack (37%). An additional 3% mentioned using other types of haptics, such as haptic guns.



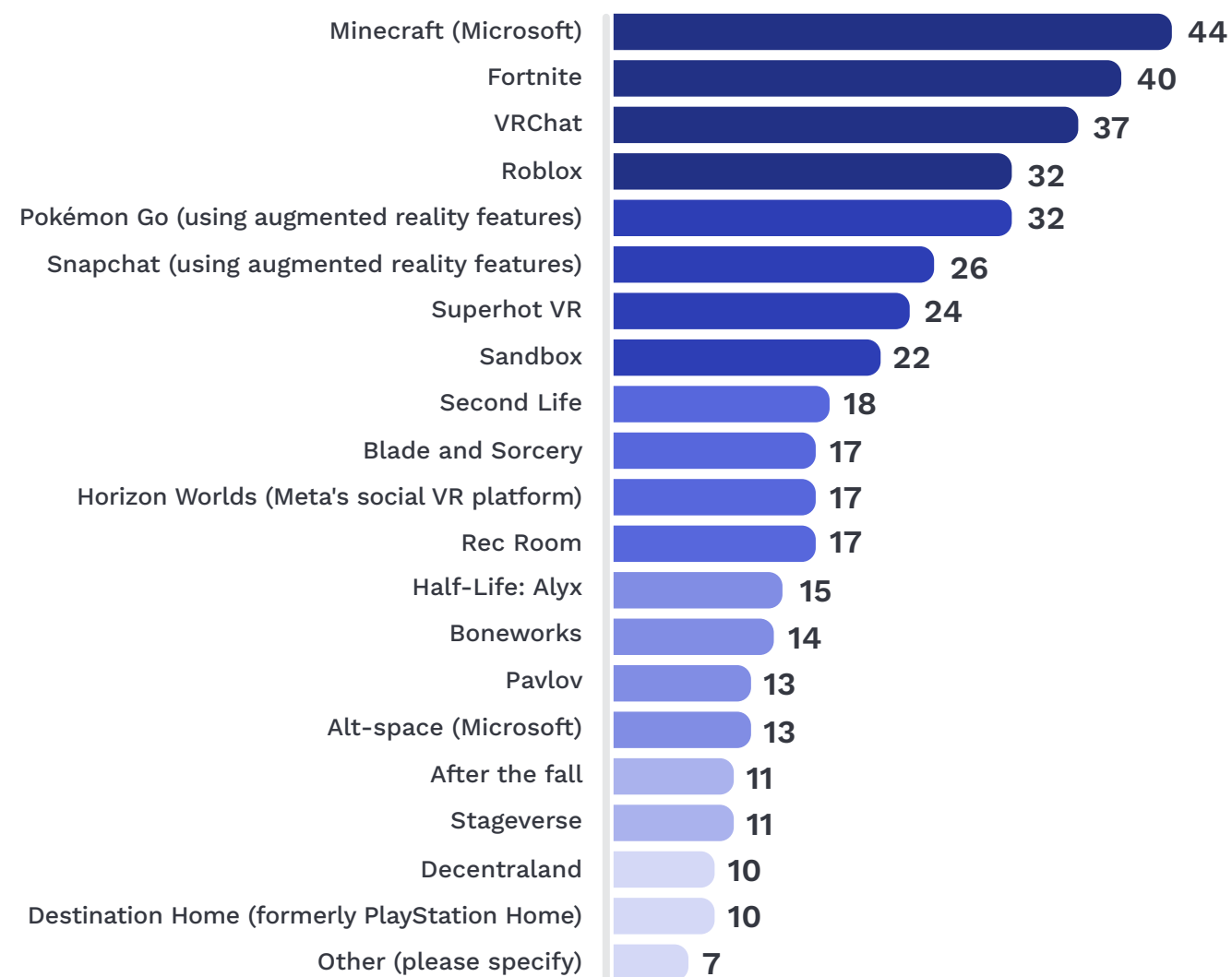


## Metaverse users played or experienced a range of games and platforms

Metaverse users reported experiencing or playing in the metaverse across a range of games and platforms. The most popular metaverse games or platforms were **Minecraft** (44%), **Fortnite** (40%) and **VRChat** (37%), followed by **Roblox** (32%) and **Pokémon Go** (32%), as shown in Figure 5.



**Figure 5:** Games and platforms played or experienced in the metaverse (%)



Q. Which of the following have you played/experienced in the metaverse?

Base: Metaverse users (n=259)



## Negative experiences in the metaverse were common

Although the metaverse offers many benefits, this research focuses on identifying harms, in line with eSafety's core safety remit. Overall, 7 in 10 (71%) metaverse users reported having had **one or more negative experiences in the metaverse** in the last 12 months.

The most common negative experiences in the metaverse (Figure 6) included being left out by others (23%), being called offensive names (21%), receiving repeated unwanted messages or contact (16%), being provoked to respond to something said or to start an argument (15%), being challenged about cultural identity (14%), and being sent unwanted inappropriate content such as porn or violent content (13%).

Some metaverse users (4%) said that 'something else' had happened in the metaverse that had upset or offended them. The descriptions provided by survey respondents indicate that these experiences included witnessing negative behaviours such as bullying or racism.





 **Figure 6:** Negative experiences in the metaverse (%)




**Q.** As far as you are aware, how often have any of the following things happened to you in the last 12 months? / Which of any of the following happened to you while interacting in the metaverse or in a virtual reality environment? Note: excludes scams, fraud, or device virus/malware.

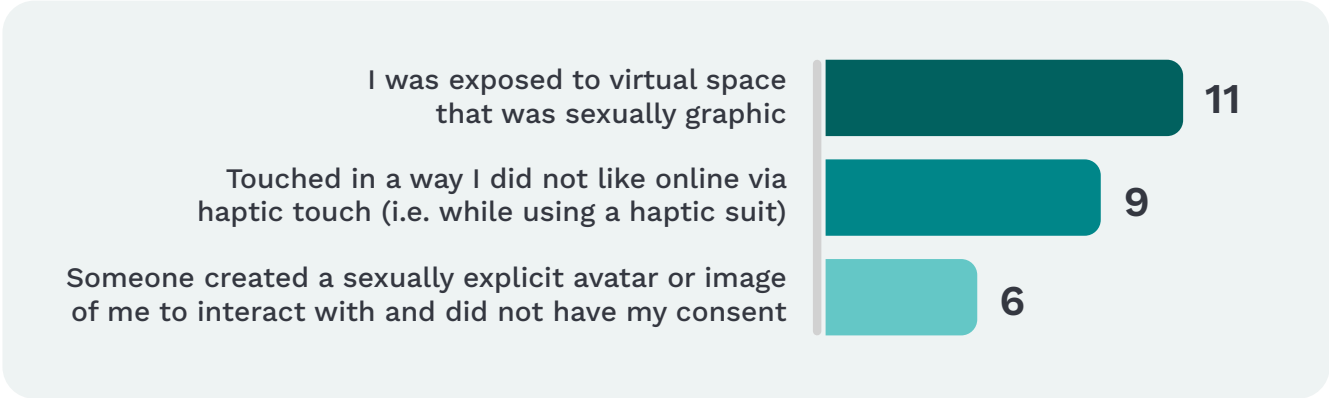
**Base:** Metaverse users who chose to answer this question (n=249)

Looking at experiences that are specific to the metaverse or that manifest differently in this environment (Figure 7), almost 1 in 10 (9%) metaverse users had been touched in a way they didn't like via haptic touch (14% of those who had used haptics). Further, 1 in 16 (6%) metaverse users reported that someone had created a sexually explicit avatar or image of them to interact with without their consent.

In addition, just over 1 in 10 (11%) metaverse users had been exposed to a virtual space that was sexually graphic. We note that this experience may or may not have been negative – for example, depending on whether the exposure was unwanted or was intentional. As such, this experience wasn't included in the total incidence for negative metaverse experiences.



 **Figure 7:** Experiences that are specific to the metaverse or that manifest differently in this environment (%)



**Q.** As far as you are aware, how often have any of the following things happened to you in the last 12 months? / Which of any of the following happened to you while interacting in the metaverse or in a virtual reality environment? / **HAPTIC TOUCH % ONLY:** As far as you are aware, how often have any of the following things happened to you in the last 12 months [selected once or twice, or more, from 7-point frequency scale].

**Base:** Metaverse users who chose to answer this question (n=249)




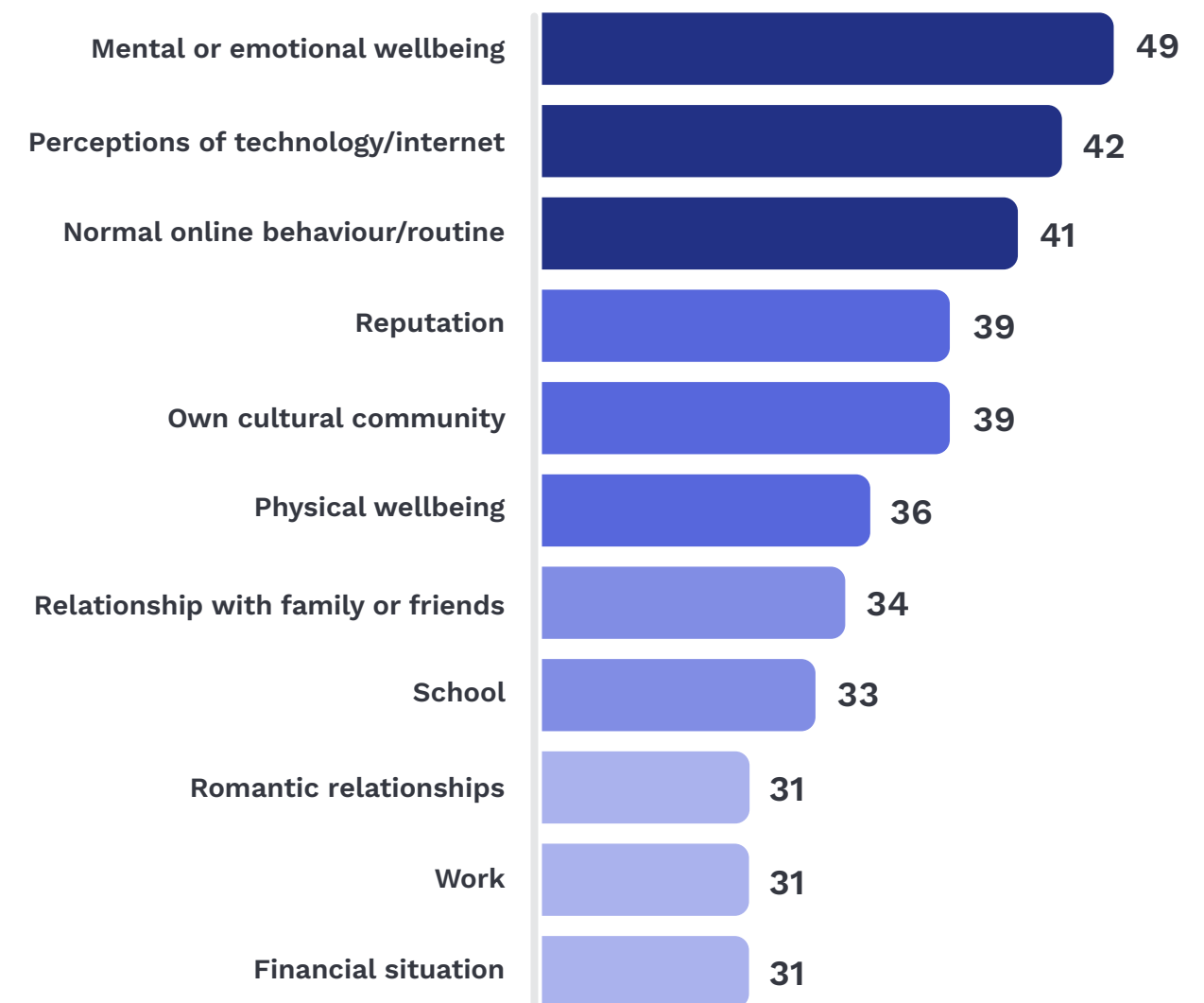
## Negative experiences in the metaverse had adverse effects on many users' health and wellbeing

This research indicates that negative experiences in the metaverse can have **detrimental effects on many aspects of health and wellbeing**, as well as on **perceptions and use of technology and the internet**. Many survey respondents who reported negative experiences in the metaverse indicated that these experiences had resulted in 'moderate', 'very' or 'extremely' (moderate to extreme) negative impacts for them.



Moderate to extreme impacts on mental or emotional wellbeing were particularly common (49%) and at least 3 in 10 respondents reported negative impacts on a range of other areas, as shown in Figure 8. This included 4 in 10 who reported negative impacts on their perception of technology or the internet (42%) and/or their normal online behaviours or routines (41%).

 **Figure 8:** Impact of experiences in the metaverse (% moderate to extreme impact)



**Q.** You mentioned that the following happened to you while interacting in the metaverse or in a virtual reality environment: [experiences selected at D1a]. To what extent were any of the following negatively impacted by this/these experiences in the metaverse? (5-point scale: No negative impact/slightly negative impact/moderately negative impact/very negative impact/extremely negative impact).

**Base:** Metaverse users who had experienced one of the incidents in the metaverse listed in QD1A, or cited 'something else' that upset or offended them in the metaverse or a VR environment (n=202)



# Conclusion

This research suggests that a significant proportion of metaverse users may encounter harmful experiences when engaging with the metaverse, including experiences that are specific to the metaverse or that manifest differently in this context, such as unwanted touching via haptics. It also suggests that such experiences can have negative impacts on the health and wellbeing of metaverse users.

These findings indicate that a proactive approach – underpinned by Safety by Design – is needed to mitigate potential risks and harms for metaverse users. This includes putting processes in place to detect, surface and flag harmful conduct, contact and content, with the aim of preventing harms in immersive environments. It is essential that industry, non-government organisations, researchers and government work together to evaluate the effectiveness of platform design features, policies and other harm prevention efforts intended to keep metaverse users safe, and to collaboratively develop new and improved approaches to safeguarding individuals.

Analysis of the survey data also revealed some contradictions in respondents’ survey responses, suggesting there is a level of confusion about what the metaverse is and the language associated with it. The potential for confusion around these terms should be considered by those who wish to communicate with the public about these issues.

Further research with larger samples of metaverse users is necessary to understand which groups may be more vulnerable to harm and to investigate how the impacts of the various types of online experiences may differ in nature or intensity when they occur in the metaverse, particularly when haptic technologies are involved. In addition, as the metaverse and the technologies that facilitate it continue to evolve, and user numbers increase, research will be required to identify new risks and benefits.

# Appendix A: Detailed methodology and limitations

## Methodology

The eSafety *Australian Adults Online* survey was conducted in November and December 2022. It comprised a sample of n=5,304 adults aged 18+ years from non-probability-based online panel providers (convenience samples). Three separate online panels were used to extract the sample, and soft quotas were set for gender, age, location and socioeconomic status (determined by postcode) to best reflect a nationally representative sample, using the latest available (2021) Australian Bureau of Statistics (ABS) population data. Weighting was applied to correct variation from the quota targets.

Table 1 shows the indicative confidence intervals that apply to the full survey sample of n=5,304 adults, as well as the subsample of n=259 metaverse users. The confidence interval for the metaverse users’ sample is +/- 6 percentage points. This means we can be 95% confident that if the entire population of adult metaverse users in Australia were surveyed, the results would fall within 6 percentage points of (above or below) the survey results. Strictly speaking, confidence intervals only apply to simple random probability samples, but they nevertheless provide a useful indication of the reliability of survey results.

**Table 1:** Indicative confidence intervals for survey sample (95% confidence level, 0.5 proportion)

Sample	Unweighted sample size	Confidence interval
All adults	5,304	+/- 1 percentage point
Metaverse users	259	+/- 6 percentage points

In this report, the survey population on which specific findings are based (e.g. all adult respondents, metaverse users or a subsection of these groups) is stated below each figure, along with the question wording. Where multiple questions are listed under a figure, this indicates that the results were aggregated from these questions.

Percentage responses may not sum to 100%, due either to rounding or to question formats that allow multiple responses. Whether a question is single response (SR) or multiple response (MR) is also stated below each figure.



## Identifying metaverse users

Previous scoping work conducted by eSafety found that the public tends to have a low level of understanding of terminology relating to immersive technology and the metaverse. Even when definitions were provided, some respondents found the terms to be confusing, or they misunderstood what was being asked; as a result, they provided inaccurate responses to these questions. In order to limit the instances of this type of error occurring in the study, we asked several questions about immersive technology and the metaverse worded in slightly different ways. Respondents were also given opportunities to elaborate on answers in free text fields. We then identified any inconsistencies between these questions and recoded the variables accordingly.

Specifically, types of immersive technology used were asked at Question B1 and again at Question B9 (for each type of game/environment used) and these were recoded to be consistent. If respondents indicated in the free text field at B9 that they didn't know how to answer the question or had misunderstood it, their responses were recoded to 'don't know' at B1 and B9. Those who answered 'yes' to visiting the metaverse (at B4), and/or connecting with other users in the metaverse (at B6), but didn't indicate that they used immersive technology, or stated that they 'never' used immersive technology/engaged in the metaverse (at B7), were recoded as 'don't know' and removed from the relevant immersive technology and/or metaverse subsamples.

## Limitations

Three key limitations should be considered when interpreting the findings of this research:

- the relatively small sample of adults identified as metaverse users
- inconsistencies in survey responses
- focus on a subsection of risks that might affect metaverse users.

## Relatively small sample of metaverse users

The total sample of n=5,304 people who completed the *Australian Adults Online* survey 2022 (i.e. the data source for this report) is large and representative of the broader population in terms of key demographics. However, the subgroup of people identified as metaverse users is relatively small (n=259). This means that the survey results for this subgroup may be more likely to vary from the experiences of the entire population of metaverse users.

The small sample size also means it isn't possible to conduct more detailed subgroup analysis of the data. For example, it's not possible to investigate whether there is a higher incidence of negative experiences in the metaverse among some groups than among others, or to identify the impacts of specific negative experiences in this environment.

Further research among larger samples of metaverse users is required to identify which groups are most at risk of experiencing harm in the metaverse. Further research is also required to fully understand the impacts of each type of negative experience and how these impacts may differ in nature or intensity when experiences occur within the metaverse as opposed to online more broadly.

## Inconsistencies in survey responses

Analysis of the survey data revealed some contradictions in respondents' survey responses. To address this limitation, the data was cleaned by removing or recoding inconsistent responses, as described above. As a result of this cleaning, we can be confident that the respondents in the subgroup identified as metaverse users have experienced the metaverse. However, it also means that some valid responses and experiences may have been removed from the data.

These contradictions in respondents' responses also demonstrate that there is not yet a consistent understanding of the metaverse or the associated terminology, as noted in the context section.

## Focus on a subsection of risks that might affect metaverse users

This research focuses on the harms that are covered by eSafety's functions and powers under the *Online Safety Act 2021*: abusive behaviours and exposure to harmful content online. We note that metaverse users may also be exposed to other types of harms that are not identified in this report, such as fraud, scams, malware and viruses.

## Appendix B: Glossary of terms

For the purposes of this research, key terms are defined as follows:

- **Augmented reality (AR)** – overlays the user’s view of the actual world with digitally generated real-time sound and vision. The combined actual and digital content is usually viewed through a handheld device (e.g. smartphone, tablet, etc.) or smart glasses (e.g. Knightfall AR, Zombie, run!, Snapchat using AR filters and Pokémon Go AR mode).
- **Haptic technologies (haptics)** – may be used in combination with AR, MR or VR to enhance the experience of being in the metaverse by providing sensory feedback and allowing the user to ‘feel’ what is happening in the virtual environment. Haptics include haptic suits, gloves and backpacks (e.g. HoloSuit, Teslasuit, Exoskin, Plexus VR Glove and Dexmo Gloves).
- **Immersive technologies** – enable users to experience and interact in three dimensions with digital content in a way that looks, feels and sounds almost real. These technologies include augmented reality, mixed reality, virtual reality and haptic technologies.
- **Metaverse** – a virtual reality space in which users can interact with a computer-generated environment and other people, while using a virtual reality headset or a device that allows them to feel what is happening in virtual environments, such as gloves or suits (i.e. haptic technologies).<sup>4</sup>
- **Metaverse users** – survey respondents who had interacted with other people using immersive technologies or while in a virtual environment and had used a virtual reality headset or haptic technologies in a platform or game.
- **Mixed reality (MR)** – combines elements of both AR and VR. In MR, digital content blends into the physical environment so that the user sees and hears the virtual elements as an extension of reality. The virtual objects or characters behave as if they are real, interacting with light, sound and space (e.g. Microsoft HoloLens).
- **Virtual reality (VR)** – uses computer hardware and software to create an artificial environment that looks and sounds as if the user is really present in that space. VR is typically accessed using VR headsets along with handheld controllers containing sensors to track head and hand movements (e.g. Snap, Oculus Quest, Oculus Rift, HTC Vive and PlayStation VR).

<sup>4</sup>As noted in the methodology section, these definitions of the metaverse and metaverse users exclude people who had only experienced virtual environments on their own, as well as those who had only experienced augmented reality without the use of haptics or a VR headset. This approach was taken because many online harms, such as cyber abuse, occur through interactions with other people. Also, many of the concerns about the metaverse specifically relate to people feeling fully immersed in an alternative reality in which experiences feel more ‘real’. This type of fully immersive experience is more applicable to virtual reality environments and/or to the use of haptics.

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