Introduction
Non-clinical genetic results (the genetic ancestry are widely available to the public, however, research shows varying degrees of how individuals understand and react to these results, and few are retained with genetic counseling support. The NIH All of Us Research Program is an ongoing, large-scale, national research program focused on including historically underrepresented in biomedical research that reflect the rich diversity of the United States. Upon enrollment, participants consent to All of Us studying their DNA for research. All of Us also values returning genetic results directly to participants so they can access information, learn about their own health, and continue to actively participate in the program.

The All of Us Research Program felt that returning non-clinical genetic results such as genetic ancestry would be a good entry point to educate participants about genetic ancestry, including uncertainty and penetrance, and could help foster participant engagement. All of Us recognized that participants may get unexpected or unplanned information when they receive their results, and that genetic counselors are beneficial in augmenting genetic results of returns to improve understanding and communication. Subsequently, All of Us provided guiding counseling support to participants via the Genetic Counseling Resource (GCR) through a multi-tier triage system. Here we describe the return of results process for genetic ancestry and traits results, with a specific focus on participant engagement and feedback through the GCR Call Center.

Methods
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Participants were selected and invited to participate in the study if they consented to DNA analysis and received an invitation to participate in the GCR Call Center. Participants who chose yes were notified again when results were ready, and were then guided through a series of digital pre-results information on the benefits and risk of receiving genetic ancestry results, participants could select yes, no, or maybe later to receiving results.

The All of Us Support Center triaged genomic-related inquiries to the GCR Call Center for resolution. When the GCR received a participant contact, genetic counselors documented the inquiry topics and quotes in detail through internal notes in the secure electronic case management system. Participant contact data between November 2, 2020 and April 30, 2022 was generated in aggregate and inquiries were coded thematically by genetic counselors.

Results
Figure 3. Most common participant inquiry topics
All of Us genetic counselors addressed participant inquiries and documented the inquiries in real-time through notes in the respective internal electronic case log. Some participants had multiple inquiry topics addressed in one contact; therefore, inquiry topic count exceeds the total number of participant contacts. The vast majority of participants asked the GCR for additional help understanding the interpretation of their genetic ancestry results, such as the breakdown of ancestry region percentage presented. The ‘Other’ category includes inquiries related to genetic results and feedback.

Conclusions
As expected, GCR Call Center uptake was low (286/81,131 = 0.4%) in return of genetic ancestry results to All of Us participants. Those that did seek genetic counseling support were able to discuss how to interpret their results and other complex topics like unexpected results, which genetic counselors are well suited to discuss.

Figure 2. All of Us Genetic Ancestry results spike and engagement
Between November 2, 2020 and April 30, 2022, 46% of All of Us participants who provided primary research program consent and submitted adequate DNA samples were notified of their choice to receive non-clinical genetic results. The majority went on to view their genetic ancestry results, which included a high-level composition of geographic regions and supplemental information explaining how ancestry was calculated. One-third completed the result satisfaction survey, and participants expressed high satisfaction with results on a five-point Likert scale.

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Table 4. All of Us GCR Call Center inquiry statistics
Data from all inquiries received by the GCR Call Center between November 2, 2020 and April 30, 2022 was generated in aggregate through the All of Us electronic support call management system and analyzed by two genetic counselors.