Annual Report 2012-2021

National Biodiversity Data Centre
A Heritage Council Programme

Project Co-Ordinator

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Key Partners

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Conservation Trust UK**

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2021 at a glance

104 transects

84 transects walked at least 6 times

74 recorders

1,000 km walked

779 hrs of effort

17,607 bumblebees

14 species recorded

All-Ireland BUMBLEBEE Monitoring Scheme

2021: Large Carder Bee in serious decline. Tree bumblebee makes a first appearance

Bombus muscorum, Large Carder Bee

Bombus hypnorum, Tree Bumblebee

2021 was the 10th year of the All-Ireland Bumblebee Monitoring Scheme. Thanks to the combined effort of the schemes expert volunteers, we know that bumblebees remain in a precarious position, with the carder bumblebees still showing worrying declines

What is it? The All-Ireland Bumblebee Monitoring Scheme is a citizen science scheme that tracks population trends in Irish bumblebees, detecting the impacts of factors such as land use and climate change on the Irish bumblebee population. It involves walking a fixed route (transect) on a monthly basis from March to October each year, when weather conditions are favorable. The number of the different bumblebee species seen along different sections of each transect are recorded. These recordings are the basic data upon which the analysis is based.

What type of analysis is completed within the scheme? Two separate analyses are undertaken to determine the change (if any) in bumblebee populations. The first is a multi-species index which estimates the overall direction of change in the bumblebee population, as a whole, using Irelands most common bumblebees (8 species). A trend line is estimated from the multi-species index which summarises the overall direction of the population change since the commencement of the recording scheme (i.e., 2012). The second type of analysis is the estimation of a trend that tracks the status of the individual species of bumblebees. The multispecies index and the individual species trends are estimated using international best practice methods developed by Statistics Netherlands (TRends and Indices for Monitoring data, TRIM, Pannoeck & van Strein, 2005; Multi-Species Indicators, MSI, Soldaat et al., 2017).

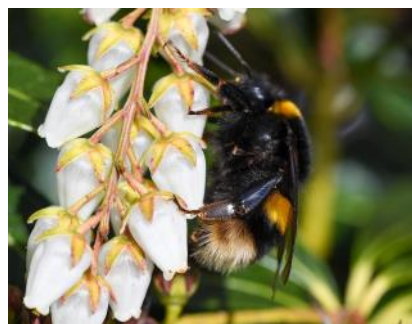# What does the addition of the 2021 data tell us?

- The most important thing it highlights is the phenomenal effort our citizen science volunteers have put in over the years. In 2021, they collectively spent over 779 hours walking just over 1,000 km, counting 17,607 bumblebees across 14 species! Without their generous efforts, we simply would not know how the populations of this vitally important group of insects are changing.

- 2021 was a very good year for the bumblebee monitoring scheme. A record eighty-four transects were walked at least 6 times from March-October. This is an incredible achievement and we thank all our volunteers.

- 2021 also saw the Tree Bumblebee (*Bombus hynorum*) picked up in the scheme for the first time. It was recorded in low numbers on two transects in N. Ireland. The Tree Bumblebee is our most recent bumblebee arrival, being first recorded from the island of Ireland in Autumn 2017.

- The impact of weather is again evident. In 2021, spring was quite cold, with the weather then picking up in May-June and dropping back again in the summer. This is reflected in the data, with July and August bumblebee numbers being well below average.

- While we do now have 10 years of data, we still have to err on the side of caution in reading too much into the trends until a longer term dataset is available. The current overall trend from 2012-2021 is a year-on-year decline of 4.1% (down from 4.6% last year). As expected, with the addition of more data each year, the estimates are improving, and as a result overall loss figures are reducing slightly. The trends do still indicate that bumblebees remain in a precarious position, but there is some evidence that things may have been stabilising in more recent years. For the first time, we have sufficient data to say that two of our more common bumblebees are stable (*Bombus terrestris* and *B. lucorum* agg.).

- Of most concern in 2021, is that the Large Carder Bee (*Bombus muscorum*) has moved into serious decline. The Common Carder Bee (*Bombus pascuorum*) remains in moderate decline. The monitoring scheme has previously flagged that the Large Carder Bee is in serious trouble in Ireland. In 2021, in response to this threat, clearly flagged by the generous monitoring efforts of our volunteers, the All-Ireland Pollinator Plan has been taking action. In August 2021, an evidence-based guideline on how local communities can help protect this bumblebee was published: https://pollinators.ie/helping-endangered-pollinators/large-carder-bee/

Bombus pascuorum · *Bombus lapidarius* · *Bombus terrestris*

Figure 1: Total number of each bumblebee species recorded in 2021

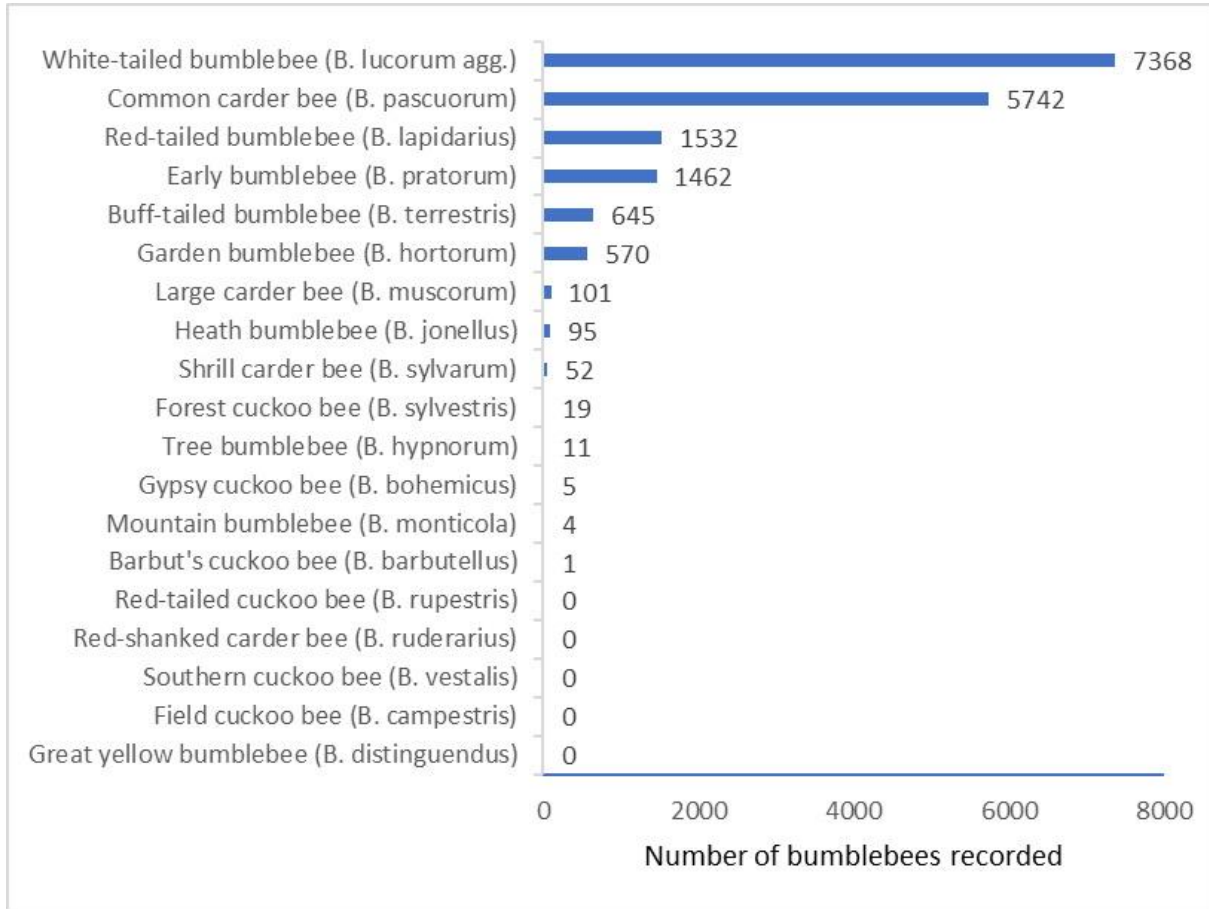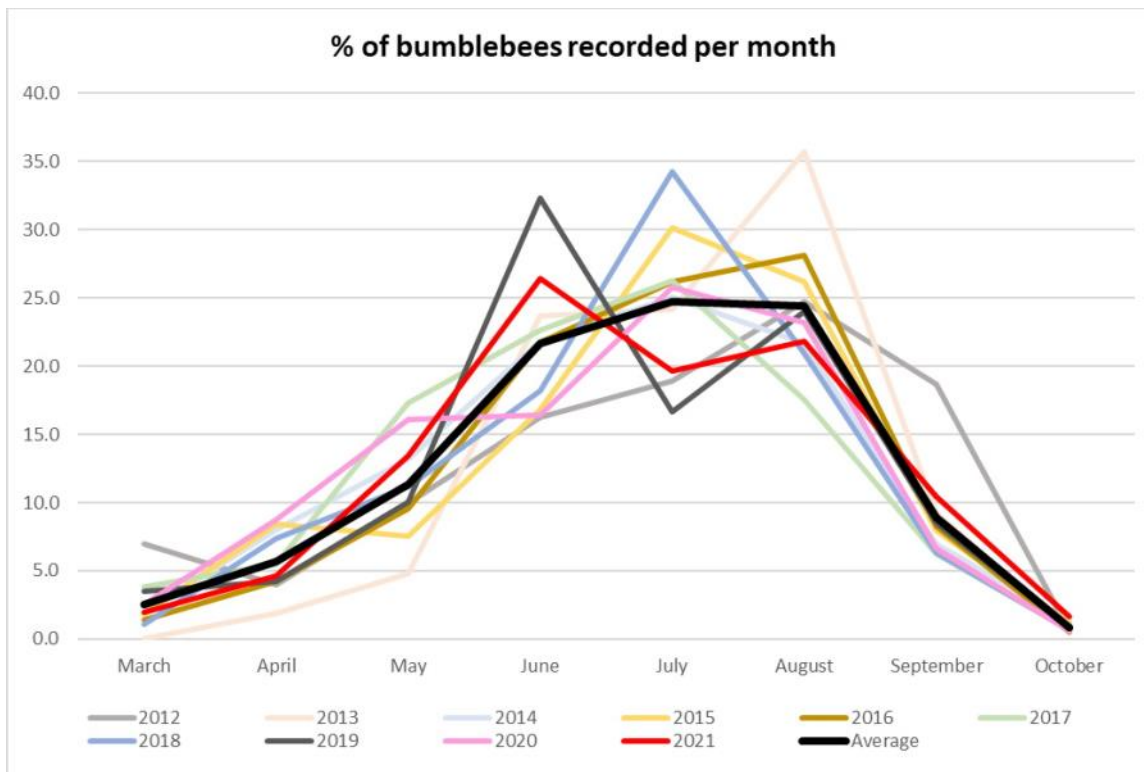**Figure 2:** Percentage of bumblebees recorded per month since 2012

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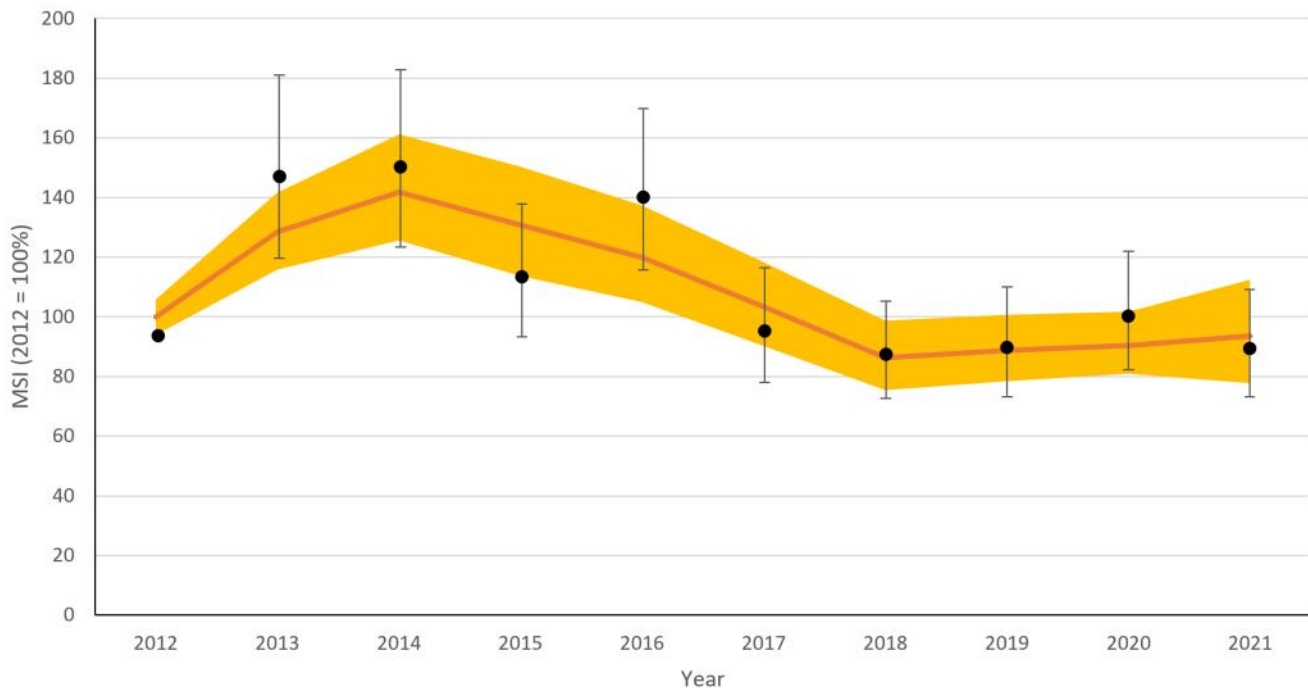
Bumblebee population trends 2012-2021

Figure 3: The multi-species index derived from the amalgamation of the population trends of 8 common species of bumblebees from 2012 to 2021. The dark orange line is the smoothed trend line, and the circle markers represent the multispecies index per year. Error bars (on markers) and the shaded area surrounding the trend line are the 95% confidence intervals.

Trends in the bumblebee population, as a whole

The "multispecies index" of bumblebee population change (above) illustrates our estimates and the level of statistical confidence around those estimates. It is based on the eight species where we have sufficient information to accurately assess changes. This year things have continued to stabilise, but it is still showing an overall loss across populations since 2012. The current overall trend from 2012-2021 is a year-on-year decline of 4.1% (with a 95% confidence interval around our estimate being ± 2.4%). While we now have ten years of data, we still have to err on the side of caution in reading too much into these trends. A longer term dataset will be necessary to smooth out the fluctuating impacts of Irish weather.

Individual species trends

While bumblebees as a whole remain in difficulties, the data also shows that some individual species are showing worrying losses. *Bombus pascuroum* (Common Carder Bee) has traditionally been one of our most common bumblebees. Things have improved slightly for the species since 2020, but it is still in moderate decline.

Unfortunately, *Bombus muscorum* has moved from a moderate decline to a strong decline. This species is listed as Vulnerable in the 2014 European Bee Red List. Ireland is one of it's strongholds within Europe, making our trends all the more concerning. In a positive, a number of local communities have been coming together through the All-Ireland Pollinator Plan to create joined up habitat corridors and protect the species in their local area. It is hoped that they can inspire others to follow their example, and give the Large Carder Bee a fighting chance at long term survival.

Bumblebee species trends 2012-2021

| Species	Change 2012-2021	Statistical Confidence
Bombus muscorum (Large carder bee)	Strong Decline (< +5% p.a.)	95%
Bombus pascuorum (Common carder bee)	Moderate Decline (< +5% p.a.)	95%
Bombus hortorum (Garden bumblebee)	Uncertain (> ±5% p.a.)	
Bombus jonellus (Heath bumblebee)		
Bombus lapidarius (Red-tailed bumblebee)		
Bombus pratorum (Early bumblebee)		
Bombus lucorum agg. (White-tailed bumblebee)	Stable	
Bombus terrestris* (Buff-tailed bumblebee)		

* Based on queens
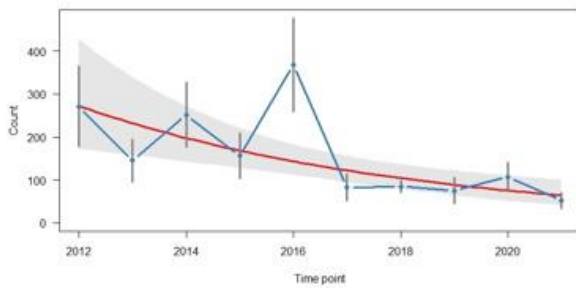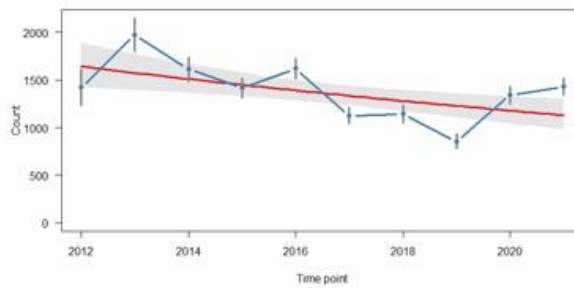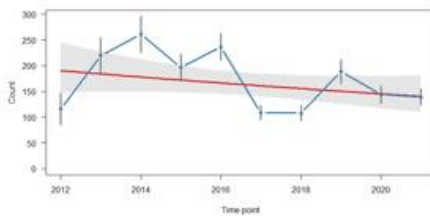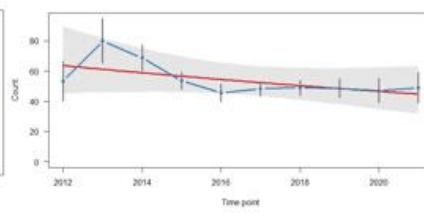
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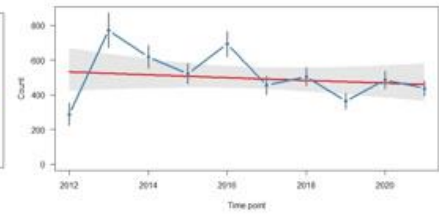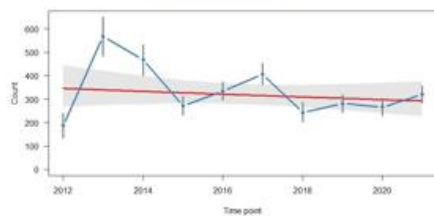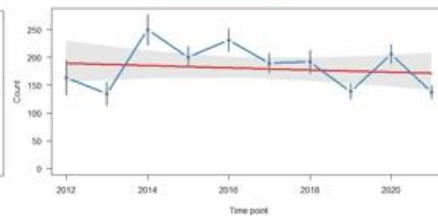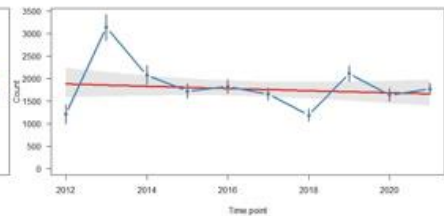
How do we want to improve the All-Ireland Bumblebee Monitoring Scheme?

1. While the scheme grew significantly in 2021, the most critical thing is that we still need more walks. It is reliant on long term walks that are visited at least 6 times a year. Where some months are missed, it is possible to calculate estimated counts using the previous and subsequent counts, but the fewer missed counts the greater the accuracy of the data. Ensuring transects are walked as much as possible, for as many years as possible, will allow us to reap the biggest benefits from the data. There is obvious and understandable flux within citizen science schemes like this, so the more walks we have the better!

2. Currently, we are only gathering sufficient data to analyse trends in eight of our most common bumblebee species. Some species are exceptionally rare and will always be outside the scheme, but there are others where a dedicated campaign to encourage volunteers to establish transects in areas where these less common species occur would be useful. This will require workshops and we hope to progress this in the coming years.

3. We need to continue ensuring that the findings of this scheme are translated into action. Within the All-Ireland Pollinator Plan, we have taken on board what it is telling us, and have been encouraging proactive measures to better protect the Large Carder Bee at local levels. This will require long-term action, but we pay tribute to those communities who have already risen to the challenge, particularly Sustainable Skerries. In positive news, two communities who have taken action by creating new habitats and ecological corridors for the bee in their local area, have both seen the bee expand it's range within a very short period of time (Skerries and Tramore). This shows that while it may be in decline, with evidence-based action, this can be reversed.

4. We now have very large quantities of data since 2012. In coming years, we hope to carry out more analyses, beyond the core multi-species index and individual species trends. For example, how concerned should we be that just two species now seem to be predominating in terms of numbers of individuals counted? We hope this will help us better understand how to improve the scheme and how to better support our volunteers. It remains our future aim to be in a position to provide feedback on individual trends to those volunteers who have long term walks in the scheme.

THANK YOU!

Most importantly, a sincere thank you to every single one of the volunteers who make this scheme possible. Without their efforts in walking their transects once per month, double-checking IDs, sending in photos and ultimately submitting their records to the Data Centre, we simply would not understand what is happening with bumblebees, and would lack the evidence-base to help us protect them into the future.

Bombus monticola

Thanks to the following for photographs: Colin Stanley, Maja Ilic, Fearghal Duffy, Jamie O'Neill, Joe Curtis, Hugh Grys.

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All-Ireland Bumblebee Monitoring Scheme recorders in 2021

Recorder	County	Recorder	County
Áine Fenner (3 walks)	Longford	Lyn Nolan	Limerick
Ann O'Connor	Wexford	Margaret Brennan (2 walks)	Carlow
Anna McEvoy	Cork	Mark Holmes	Mayo
Anthea Southey	Kilkenny	Martin Malachy	Fermanagh
Barry Walsh (2 walks)	Wicklow	Mary Brennan	Kilkenny
Breda Curran	Kilkenny	Mary Foley	Wexford
Carol Killarney	Galway	Mary Montaut	Dublin
Catherine Penny (2 walks)	Limerick	Michael McAllister	Antrim
Celia Graebner	Mayo	Michelle Judge	Waterford
Charles Heasman (4 walks)	Dublin	Mireille McCall (2 walks)	Kildare
Ciara Ni Laighin	Limerick	Muriel Moore (2 walks)	Antrim
Ciaran Taylor	Wicklow	Muriel Moore (2 walks)	Down
Colette Blaney	Limerick	Nabla Rea	Kilkenny
Damien Clarke	Antrim	Oisín & Mairead Duffy (2 walks)	Waterford
Dara Stanley	Dublin	Pascal Downing	Armagh
Deirdre NicLochlainn	Donegal	Pat Foley	Offaly
Donal Toolan	Waterford	Pat Walsh	Kildare
Edward Hill	Dublin	Patrick Fahy (2 walks)	Mayo
Edward Hill (2 walks)	Kildare	Paula Farrell	Kildare
Emma Stewart-Liberty (2 walks)	Clare	Ralph Sheppard	Donegal
Geoff Newell (2 walks)	Antrim	Raymond Kazmierczak	Clare
Gerard Kavanagh	Dublin	Rob Wheeldon	Leitrim
Hugh Lee	Wicklow	Rose Cremin	Fermanagh
Ian Edwards	Wicklow	Ruth Maxwell	Westmeath
Isobel Kurz	Wicklow	Ruth Wilson	Down
Jane O'Sullivan	Kerry	Sallyann Marron	Clare
Janet Whelehan	Wexford	Saorla Kavanagh	Waterford
Jeanne Sampier (3 walks)	Galway	Sean Forde (2 walks)	Kerry
Jerome Walsh	Laois	Sharon Parr	Clare
Joanna Hodghton (2 walks)	Wexford	Sophia Couchman	Carlow
Justin Ivory (5 walks)	Wicklow	Sophia Couchman	Kildare
Karina Dingerkus	Mayo	Sr Fionnuala O'Connor	Dublin
Katy Bell	Fermanagh	Tara Dirilgen	Dublin
Kirsty Orr	Down	Tom Gittings (2 walks)	Cork
Kristi Leyden	Clare	Tony Miller	Cork
Lee Donohue	Meath	Trish McAndrew	Mayo
Leif Barry	Dublin	Úna Fitzpatrick (3 walks)	Waterford
Louise Garcia (2 walks)	Tipperary	William Bryan	Waterford

These were all registered on the online system and at least one month of data added for 2021. Not all were included in analyses.

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