Plain-Language Abstract
Quick-Start Guide

A plain-language abstract (PLA)[1] is a short, simple explanation of your research. It should be understandable by an average member of the public. The purpose is to make your research more accessible to more people. Research that is easily understood is more easily remembered, reported, cited and funded.

The PLA should answer 4-5 questions about your research. It is usually much shorter than the original abstract. You aren't trying to summarize your dissertation; you will be making no mention of large parts of the document.

To create a PLA, answer the following questions in the most straightforward, direct language possible. You may need to skip or add a question, depending on your thesis/dissertation.

1. What context, if any, does the reader need to know to help them understand the topic?

2. What did you study?

3. How did you study it?

4. What did you find?

5. Why should the reader care, or, put another way, what can be done with your results?

[1] A note about terminology: there are several terms in use internationally for a shortened, simplified explanation of complex information, including plain-language summary, plain-language abstract, lay abstract, simplified abstract, and others. Definitions are not yet standardized, but the aim of all these forms is the same.

EXAMPLES

1. What context does the reader need?

Top tip: Stick to one or two sentences to answer this question.

☒	Hibernation is a collection of physiological strategies that allows animals to inhabit inhospitable environments, where they experience extreme thermal challenges and scarcity of food and water. Many different kinds of animals employ hibernation, and there is a spectrum of hibernation phenotypes. Here, we focus on the Ursus family, obligatory mammalian hibernators, to identify any changes in hibernation behavior brought about by the rise in average air temperature over the past thirty years. Changes in weather conditions are known to affect the cellular and molecular processes that protect hibernators during their period of low activity. It seems natural then to ask whether and how climate change has placed additional physiological stress on the bears we studied."
☑	Hibernating too long puts extra stress on the animals' bodies. If the animals don't hibernate long enough, they may leave their dens only to find that the plants and animals they eat are not plentiful yet.

2. What did I study?

Top tip: Opt for a general description and leave out details that are not strictly necessary.

☒	"studied the effects of climate change on *Ursus americanus and Ursus arctos* in North America…."
☑	"studied the effects of climate change on hibernating bears in North America…."

3. How did I study it?

Top tip: Don't "nominalize" words; don't use a noun derived from a perfectly suitable verb. For example, "we conducted an analysis" is less direct than "we analyzed." "We constructed a simulation of…" is more complex than "we simulated…."

☒	"We recorded a series of field observations aimed at determining the duration of their annual hibernation period and the type of hibernation locations they chose…."
☑	"We watched the bears to see if they changed where or how long they hibernated…."

4. What did I find out (or observe or conclude)?

Top tip: unlike your dissertation, in a plain-language abstract, it is preferable to use approximate numbers and measurements such as "roughly three-fourths" instead of "76.21 percent."

☒	"We noted that *Ursus americanus'* length of hibernation during the five-year study period increased over the 1995-2015 average by 3.6 weeks and *Ursus arctos*' by 4.2 weeks…."
☑	"The bears hibernated about a month longer than usual…."

5. What is your work's value (or what are the implications)?
   Top tip: avoid the temptation to fall into passive voice in this section.

☒	"it is hoped," "a consensus was reached," "a plan was formulated"
☑	"We hope," "the participants agreed," "They planned"

On the following pages are examples presented in various ways to show you complete PLAs.

"Associations Between Eight Earth Observation-Derived Climate Variables and Enteropathogen Infection: An Independent Participant Data Meta-Analysis of Surveillance Studies With Broad Spectrum Nucleic Acid Diagnostics"[2]

Plain Language Abstract

Background →	Diarrheal disease is a big health problem for children. It can be caused by different bugs, which can be caught more easily in certain weather conditions, though not much is understood about this because the climate varies so much from one place to the next. This study combined data from many different countries where diarrhea-causing bugs were diagnosed in children's stool. Satellites recorded what the weather was like on the day each sample was collected.	← What did we study?
What did we find? →	Rotavirus is easiest to catch in cold weather and when water washes over the ground after rain. Dry weather also makes it and other viruses easy to catch. Bacteria spread best when the air is warm and humid and the soil moist, though one type of E. coli can also be spread in rainwater. Climate change will make dry places drier, wet places wetter and everywhere warmer. This might lead to more diarrhea caused by bacteria and less by viruses in some places, though places with moist soil might see more of every kind of bug.	← What are the implications?

[2] Colston, J. M., Zaitchik, B. F., Badr, H. S., Burnett, E., Ali, S. A., Rayamajhi, A., et al. (2022). Associations between eight Earth observation-derived climate variables and enteropathogen infection: An independent participant data metaanalysis of surveillance studies with broad spectrum nucleic acid diagnostics. GeoHealth, 6, e2021GH000452. https:// doi.org/10.1029/2021GH000452

Methods for Estimating Wet Bulb Globe Temperature from Remote and Low-Cost Data: A Comparative Study in Central Alabama[3]

Section/topic	Scientific Abstract (248 words)	Plain-Language Abstract (172 words, 30% shorter)
Context and background	Heat stress is a significant health concern that can lead to illness, injury, and mortality. The wet bulb globe temperature (WBGT) index is one method for monitoring environmental heat risk. Generally, WBGT is estimated using a heat stress monitor that includes sensors capable of measuring ambient, wet bulb, and black globe temperature, and these measurements are combined to calculate WBGT. However, this method can be expensive, time-consuming, and requires careful attention to ensure accurate and repeatable data. Therefore, researchers have attempted to use standard meteorological measurements, using single data sources as an input (e.g., weather stations) to calculate WBGT.	Heat stress is a buildup of body heat that can lead to illness, injury, or death. One method for estimating heat stress is an index called wet bulb globe temperature (WBGT). The index is usually measured with a monitor that records three types of temperature measurements and combines them. However, this method can be expensive, time-consuming, and requires careful attention. Therefore, researchers have tried to use standard measurements such as wind speed, temperature, humidity, etc., to calculate WBGT.
What was studied and how it was studied	Building on these efforts, we apply data from a variety of sources to calculate WBGT, understand the accuracy of our estimated equation, and compare the performance of different sources of input data. To do this, WBGT measurements were collected from Kestrel 5400 Heat Stress Trackers installed in three locations in Alabama. Data were also drawn from local weather stations, North American Land Data Assimilation System (NLDAS), and low-cost iButton hygrometers. We applied previously published equations for estimating natural wet bulb temperature, globe temperature, and WBGT to these diverse data sources.	Building on these efforts, we wanted to determine if it was possible to accurately calculate WBGT with a variety of inexpensive data sources in central Alabama. We used previously published equations to estimate WBGT.
Results	Correlation results showed that WBGT estimates derived from all proxy data sources—weather station, weather station/iButton, NLDAS, NLDAS/ iButton—were statistically indistinguishable from each other, or from the Kestrel measurements, at two of the three sites. However, at the same two sites, the addition of iButtons significantly reduced root mean square error and bias compared to other methods.	Results showed that all proxy methods accurately estimated WBGT in two Alabama locations, but that using local measurements did change estimates of the number of potentially dangerous heat episodes relative to estimates that rely on remote sources of weather data.
Significance	(Included in first paragraph)	The ability to use easily accessible measurements could be a powerful tool for studies and interventions related to heat stress.

[3] Carter, A. W., Zaitchik, B. F., Gohlke, J. M., Wang, S., & Richardson, M. B. (2020). Methods for Estimating Wet Bulb Globe Temperature From Remote and Low-Cost Data: A Comparative Study in Central Alabama. *GeoHealth*, *4*(5), e2019GH000231. https://doi.org/10.1029/2019GH000231

Modifying the secondary school environment to reduce bullying and aggression: the INCLUSIVE cluster RCT[4]

Scientific Abstract:

Bullying, aggression and violence among children and young people are some of the most consequential public mental health problems.

The INCLUSIVE (initiating change locally in bullying and aggression through the school environment) trial evaluated the Learning Together intervention, which involved students in efforts to modify their school environment using restorative approaches and to develop social and emotional skills. We hypothesised that in schools receiving Learning Together there would be lower rates of self-reported bullying and perpetration of aggression and improved student biopsychosocial health at follow-up than in control schools.

INCLUSIVE was a cluster randomised trial with integral economic and process evaluations.

Forty secondary schools in south-east England took part. Schools were randomly assigned to implement the Learning Together intervention over 3 years or to continue standard practice (controls).

A total of 6667 (93.6%) students participated at baseline and 5960 (83.3%) students participated at final follow-up. No schools withdrew from the study.

Schools were provided with (1) a social and emotional curriculum, (2) all-staff training in restorative approaches, (3) an external facilitator to help convene an action group to revise rules and policies and to oversee intervention delivery and (4) information on local needs to inform decisions.

Self-reported experience of bullying victimisation (Gatehouse Bullying Scale) and perpetration of aggression (Edinburgh Study of Youth Transitions and Crime school misbehaviour subscale) measured at 36 months. Intention-to-treat analysis using longitudinal mixed-effects models.

Primary outcomes – Gatehouse Bullying Scale scores were significantly lower among intervention schools than among control schools at 36 months (adjusted mean difference –0.03, 95% confidence interval –0.06 to 0.00). There was no evidence of a difference in Edinburgh Study of Youth Transitions and Crime scores. Secondary outcomes – students in intervention schools had higher quality of life (adjusted mean difference 1.44, 95% confidence interval 0.07 to 2.17) and psychological well-being scores (adjusted mean difference 0.33, 95% confidence interval 0.00 to 0.66), lower psychological total difficulties (Strengths and Difficulties Questionnaire) score (adjusted mean difference –0.54, 95% confidence interval –0.83 to –0.25), and lower odds of having smoked (odds ratio 0.58, 95% confidence interval 0.43 to 0.80), drunk alcohol (odds ratio 0.72, 95% confidence interval 0.56 to 0.92), been offered or tried illicit drugs (odds ratio 0.51, 95% confidence interval 0.36 to 0.73) and been in contact with police in the previous 12 months (odds ratio 0.74, 95% confidence interval 0.56 to 0.97). The total numbers of reported serious adverse events were similar in each arm. There were no changes for staff outcomes. Process evaluation – fidelity

[4] Bonell C, Allen E, Warren E, McGowan J, Bevilacqua L, Jamal F, *et al.* Modifying the secondary school environment to reduce bullying and aggression: the INCLUSIVE cluster RCT. *Public Health Res* 2019;7(18)

was variable, with a reduction in year 3. Over half of the staff were aware that the school was taking steps to reduce bullying and aggression. Economic evaluation – mean (standard deviation) total education sector-related costs were £116 (£47) per pupil in the control arm compared with £163 (£69) in the intervention arm over the first two facilitated years, and £63 (£33) and £74 (£37) per pupil, respectively, in the final, unfacilitated, year. Overall, the intervention was associated with higher costs, but the mean gain in students' health-related quality of life was slightly higher in the intervention arm. The incremental cost per quality-adjusted life year was £13,284 (95% confidence interval –£32,175 to £58,743) and £1875 (95% confidence interval –£12,945 to £16,695) at 2 and 3 years, respectively.

Our trial was carried out in urban and periurban settings in the counties around London. The large number of secondary outcomes investigated necessitated multiple statistical testing. Fidelity of implementation of Learning Together was variable.

Learning Together is effective across a very broad range of key public health targets for adolescents.

Further studies are required to assess refined versions of this intervention in other settings.

Plain-Language Abstract

Bullying, aggression and violence among young people are important mental health problems. The trial reported here evaluated the Learning Together intervention, which involved school staff and students collaborating on an 'action group' to change school rules and policies and make other changes across the school to make it a healthier place. This included using restorative approaches (which focus on improving relationships) rather than merely punishment-based approaches to discipline and using a classroom curriculum aimed at fostering social and emotional skills. These aimed to reduce bullying and aggression and to promote student health and well-being.

We compared 20 schools in southeast England that were randomly allocated to deliver the intervention over 3 years with 20 schools continuing with existing practices. Schools were provided with an external facilitator to help convene the action group, with all-staff training in restorative approaches and with curriculum materials.

About 6,600 students completed a baseline questionnaire. Of the roughly 6,000 students who completed a follow-up questionnaire three years later, far fewer students reported being bullied in schools that had the intervention being bullied after the Learning Together program was significantly smaller in intervention schools than among comparison schools. There was no difference in the numbers of students reporting acts of aggression. Students in intervention schools reported having a higher quality of life and psychological well-being, fewer psychological difficulties and were less likely to have smoked, drunk alcohol, used or been offered illicit drugs, or to have been in legal trouble in the past year. The intervention was acceptable to schools and provided strong value for money.

Learning Together is effective across a very broad range of key public health targets for adolescents.

WRITING YOUR PLA

Consider setting aside your standard abstract and writing from a blank slate when it is time to write your PLA. Doing so will help you avoid the temptation to summarize your abstract. Try this instead:

1. Ask yourself the questions on page __ and write down the answers in the most straightforward language you can.
2. Use Grammarly (free to all students, click here to download) as your first editing pass. When you start editing the document, you'll be asked to choose goals. For a PLA, choose these:
    - Audience: general
    - Formality: neutral
    - Domain: general
    - Intent: Inform

    If you aren't asked to set your goals, you can set them by clicking the target & arrow icon
3.

Some ways to "plain-ify" your language

Keep sentence structure simple. Aim for sentences of 15-25 words. Keep paragraphs to 3-4 sentences when possible.

Go for "subject-verb-object" constructions like "the bears stole picnic baskets" instead of "picnic baskets were stolen by the bears."

Feel free to use questions to make things clear. "Does this mean only you can prevent forest fires? The research says yes."

Avoid jargon and technical language. Words that are familiar to you may mean something else to people not in your field: a geologist refers to rock moving along a crack as a fault, while a typical reader will think "flaw" or "failure." A civil engineer's "shear" might mean "cut" to a typical reader rather than an external force moving in the opposite direction of an internal force. If there is no plain alternative, explain the meaning of the words you use.

Use simple metaphors to help the reader understand ("the wetlands are nature's sponge," "RNA is the messenger," etc.)

Use contractions.

Anticipate readers' questions and answer them in the order those questions are likely to be asked.

are currently	are
were previously	were
at this time	now
has the ability to	can
in order to	to
in addition to	and
in relation to	regarding, about
in the near future	soon
in the not-too-distant future	eventually
is suggestive of	suggests
pertaining to	about
come to the conclusion	conclude
conduct observations	observe
with the exception of	except, other than
until such time as	until
despite the fact that	even though, although
as a result of	because of
assuming	if
reach an agreement	agree
conduct an investigation	investigate
has the ability to	can
in the event that	if, when
in the vicinity of	close to
make reference to	refer to
on a regular basis	regularly
subsequent to	after
we are of the opinion	we think, we believe, we argue
as of late	lately
do harm to	harm
in excess of	more than, over
this point in time	point, time, currently
in the event of	if

in view of the above	so, therefore
utilize	use
carry out a review	Review
Can be explained by	Is due to, is because
Until such time	
During the period between	Between
In the process of	(omit)
Provides guidance	Guides
In regard to	About
Absolutely essential	Essential
Added bonus	Bonus
Pre-planning	Planning
All of a sudden	Suddenly
As a matter of fact	In fact
As of right now	Currently
At the same time	While
Careful scrutiny	Scrutiny
Advantageous	Useful, helpful
During which time	While
Facilitate	Make possible, help, assist
The question as the whether	Whether
Adequate supply of, adequate number of	Enough
Whether or not	Whether