



## HDR HELPFUL HINTS

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# Uses of AI in research – choosing and applying the methods

## SUMMARY

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AI can be used to help you choose, design, and develop your research methods. For example, you can use AI to help you

- select the most efficient, economical, or valid measures to collect data or manipulate variables,
- practice interviewing people or conducting other methods
- choose a suitable methodology in qualitative research or research design in quantitative research,
- design experimental materials, such as images or videos.

## CHOOSING QUALITATIVE DESIGNS

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You may use generative AI, such as Chat GPT, to help you select an appropriate research design. In qualitative research, for example, you could use generative AI to help you decide the underlying philosophy, paradigm, theoretical perspective, and methodology or approach. The following table illustrates some of the questions you could ask. The grey font represents examples that you would adapt to your circumstances.

PRACTICE	EXAMPLES
<ul style="list-style-type: none"><li>• Ask the tool to outline the philosophical stances you could adopt.</li></ul>	<ul style="list-style-type: none"><li>• I want to conduct qualitative research that characterises the experience of international HDR candidates who report a disability. Which philosophical positions may be suitable?</li></ul>

	<ul style="list-style-type: none"> <li>• That is, which ontological and epistemological positions should I consider?</li> <li>• And can you explain these ontological and epistemological positions?</li> </ul>
<ul style="list-style-type: none"> <li>• Prompt the tool to discuss which paradigms may correspond to the chosen philosophies.</li> </ul>	<ul style="list-style-type: none"> <li>• If I choose a constructivist ontological position and a critical epistemology, what are the various paradigms I should consider—such as pragmatism or post-positivism?</li> <li>• What are the key features of each paradigm?</li> </ul>
<ul style="list-style-type: none"> <li>• Ask the tool to outline the theoretical perspectives that correspond to the chosen paradigm</li> </ul>	<ul style="list-style-type: none"> <li>• If I choose a pragmatist paradigm, what are some theoretical perspectives that may be suitable?</li> <li>• What are the key assumptions of each theoretical perspective?</li> <li>• How can I decide which theoretical perspective to adopt?</li> </ul>
<ul style="list-style-type: none"> <li>• Prompt the tool to suggest methodologies or approaches that may correspond to the chosen theoretical perspective.</li> </ul>	<ul style="list-style-type: none"> <li>• Which qualitative methodologies could I consider?</li> <li>• What are some more recent qualitative methodologies that researchers have developed?</li> <li>• What are the benefits and drawbacks of these methodologies?</li> </ul>

Remember that, after you ask a question,

- prompt the tool to present more details, such as “Can you provide further details or examples?”,
- prompt the tool to outline some of the controversies, such as “Can you outline some alternative perspectives to this answer?”,
- use the library to verify the responses.

## CHOOSING QUANTITATIVE DESIGNS

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You can also use generative AI to help you choose a quantitative design—such as a randomised control trial or RCT, cluster RCT, quasi-experiment, observational design, case control study, cohort study, or step-wedge design. For example, you could adapt the questions that appear in the following table.

PRACTICE	EXAMPLES
<ul style="list-style-type: none"> <li>After outlining your research questions and everything you have decided about your research, ask the tool to recommend the possible research designs.</li> </ul>	<ul style="list-style-type: none"> <li>I want to conduct research that explores which personal characteristics affect the association between meditation and diabetes. I plan to administer a survey that assesses various characteristics. I could measure or manipulate meditation. And I can measure diabetes with a range of methods.</li> <li>Which research designs should I consider? Possibilities include a randomised control trial or RCT, cluster RCT, quasi-experiment, observational design, case control study, cohort study, or step-wedge design.</li> </ul>
<ul style="list-style-type: none"> <li>Prompt the tool to consider the benefits and drawbacks of each design.</li> </ul>	<ul style="list-style-type: none"> <li>What are the benefits and limitations of each design?</li> </ul>
<ul style="list-style-type: none"> <li>Ask the tool to illustrate how you could apply each design</li> </ul>	<ul style="list-style-type: none"> <li>Could you illustrate how I could apply each design to explore my research question? That is, for each design, could you write one to two paragraphs on how I could apply this design to explore which personal characteristics affect the association between meditation and diabetes.</li> </ul>
<ul style="list-style-type: none"> <li>Prompt the tool to consider the variants of each design.</li> </ul>	<ul style="list-style-type: none"> <li>Could you identify the main variations of each design. For example, RCTs can be between-subject or within-subject.</li> <li>Can you outline the benefits and limitations of each variation?</li> </ul>

## CHOOSING AND APPLYING METHODS TO COLLECT DATA.

Thus far, this document has demonstrated how researchers can utilise generative AI to select appropriate methodologies or designs. You could also use generative AI to help you choose suitable methods to collect data. You can even use these tools to help you practice these methods. The following table illustrates how

you can achieve this goal. In all instances, you should then consult the literature, your supervisors, and other specialists to confirm and to explore the information you receive.

PRACTICE	EXAMPLES
<ul style="list-style-type: none"> <li>Ask the tool to identify the range of options you should consider to measure some variable.</li> </ul>	<ul style="list-style-type: none"> <li>I am studying whether age affects the relationship between meditation and diabetes. Which tools can I use to measure meditation? Which tools can I use to measure the risk of diabetes?</li> </ul>
<ul style="list-style-type: none"> <li>Prompt the tool to evaluate these methods—such as the cost, efficiency, and validity.</li> </ul>	<ul style="list-style-type: none"> <li>You specified several measures I can use to measure the risk of diabetes? What is the cost of each measure in US dollars?</li> <li>Which measure is the quickest to administer?</li> <li>Which measure is the most valid or accurate?</li> <li>Can you suggest some papers I should read to support these claims?</li> </ul>
<ul style="list-style-type: none"> <li>Ask the tool to help you administer or apply these measures or techniques effectively.</li> </ul>	<ul style="list-style-type: none"> <li>When applying this method, what are the most common mistakes that people commit?</li> <li>How can I avoid these mistakes?</li> </ul>
<ul style="list-style-type: none"> <li>Use the tool to practice interviews and thus to develop your interviewing skills</li> </ul>	<ul style="list-style-type: none"> <li>I want to conduct qualitative research that examines the experience of international HDR candidates who report a disability.</li> <li>I would like you to assume the role of an international HDR candidate with impaired vision. Can I interview you—so I can develop my interviewing skills?</li> <li>And can you provide feedback about how I could improve my questions. How could I have improved this interview?</li> <li>First, tell me about why you chose to study a PhD...</li> </ul>

## CHOOSING AND DEVELOPING METHODS TO MANIPULATE VARIABLES

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Besides measuring variables, you may also need to introduce procedures, interventions, or treatments to manipulate variables. AI tools can help you choose these procedures, interventions, or treatments as well as develop these methods.

PRACTICE	EXAMPLES
<ul style="list-style-type: none"><li>• Ask the tool to identify the range of options you should consider to manipulate some variable</li></ul>	<ul style="list-style-type: none"><li>• I am studying whether age affects the relationship between mood and diabetes. How should I manipulate the mood of participants?</li><li>• I am studying whether the temperature of materials affects malleability. How should I manipulate the temperature of materials as precisely as possible?</li></ul>
<ul style="list-style-type: none"><li>• Like the previous section, prompt the tool to evaluate these methods—such as the cost, efficiency, and validity.</li><li>• Ask the tool to help you administer or apply these measures or techniques effectively.</li></ul>	<ul style="list-style-type: none"><li>• When applying this method, what are the most common mistakes that people commit? How can I avoid these mistakes?</li></ul>

Generative AI can also be used to generate stimuli in experiments. To illustrate,

- suppose you want to assess whether the eye colour of people affects whether they are trusted,
- you could thus ask an AI tool, such as DALL-E, to create two sets of portraits that are identical except the eye colour,
- or you could ask other AI tools, such as Reeler, to create two videos that are identical except the eye colour of protagonists.

The following table outlines some AI tools you could use to generate images or videos from text. That is, for each of these tools, users enter a prompt, such as “please generate a face that looks scary”, to produce an image—such as photos, artworks, and illustrations, or video. This table also includes a few details about the distinct features of each tool.

AI TOOLS THAT GENERATE IMAGES	AI TOOLS THAT GENERATE FROM TEXT
Adobe Firefly <ul style="list-style-type: none"> <li>• A free version is available.</li> </ul>	Reeler <ul style="list-style-type: none"> <li>• A free trial version may create up to 3 free videos</li> <li>• For US \$10 a month, you can generate 30 videos.</li> <li>• Enterprise licenses are also available.</li> </ul>
DALL-E	Flickify
Midjourney <ul style="list-style-type: none"> <li>• Compared to some tools, such as Leonardo, Midjourney can generate vivid images even when the prompts are ambiguous.</li> </ul>	Hourone <ul style="list-style-type: none"> <li>• Converts text to videos of avatars—and thus useful to create training videos.</li> </ul>
Leonardo AI <ul style="list-style-type: none"> <li>• Compared to some tools, such as Midjourney, Leonardo enables users to finetune the images better.</li> <li>• You can then use Canvas to edit the images you create.</li> </ul>	Lumiere 3D <ul style="list-style-type: none"> <li>• Generates AI videos for marketing purposes</li> </ul>

Other AI tools could also improve the production of images, videos, or other experimental materials. The following table illustrates some examples.

OTHER USEFUL AI TOOLS	
<ul style="list-style-type: none"> <li>• EbSynth</li> </ul>	<ul style="list-style-type: none"> <li>• Can convert paintings or images to videos.</li> <li>• Can edit videos.</li> </ul>
<ul style="list-style-type: none"> <li>• Magicroll.ai</li> </ul>	<ul style="list-style-type: none"> <li>• Automates the editing of videos—especially videos in which a person speaks, such as video podcasts.</li> <li>• You can experiment with the tool at no cost—but edit up to 5 videos a month, each of 120 seconds duration.</li> <li>• Paid versions permit long or unrestricted videos with more advanced editing tools.</li> </ul>

