

A – Stimulus development and pretest

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A.1 Examples from previous studies

Authors	Cognitive Empathy	Affective Empathy
Liu and Sundar (2018)	“genital issues could be annoying”	“I could imagine how annoying genital issues can be”
	“itchiness could be quite disturbing”	“I understand your anxiety about being infected” etc.
Park et al. (2023)	“she must be in horrible pain, both physically and mentally”	“I feel the same. I think I can feel what she feels.”
	Affiliative Humor	Self-defeating Humor
Shin et al. (2023)	„Why did the TSA agent turn away the penguin? Because penguins can't fly! Ha! Just kidding! Searching for flights now”	-
Ceha et al. (2021)	“What's a rock's worst enemy? Paper, haha”	“You know that feeling when you're taught something and understand it right away?... Yeah, not me! Haha!”
	“I've got a joke! What did the one volcano say to the other?... I lava you!”	“When you're a computer but can't learn things by yourself haha”

References

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A.2 Pretest – Questionnaire (translated from German)

(1) Introduction

Dear science enthusiasts,

Thank you for participating in this survey. Your contribution is very valuable for our research.

With this survey, we would like to find out how you rate different answers given by an AI system. There are no right or wrong answers. Therefore, please select the answer options that you think are most likely. The survey will take about 10 minutes.

(2) Instruction

On the following pages, you will see excerpts of a dialogue between a person and an AI system. The dialogue is about a person asking questions about nutritional supplements and the AI system answering them.

We ask you to focus solely on the wording of the answer in your evaluations—regardless of the fact that it comes from an AI system.

(3) Evaluation

To what extent do you agree with the following statements?

The AI's response is worded ...

... objective.

... empathic (i.e., compassionate and understanding).

... humorous.

Scale: (1) strongly disagree to (5) totally agree.

A.3 Pretest – Results (translated from German)

Cognitive empathy 1:

Human:	“I understand. Why does one take nutritional supplements at all?”
AI:	“Modern everyday life often leaves little time for balanced nutrition. I can completely understand that nutritional supplements are a convenient solution for many people to compensate for suspected nutrient deficiencies—even if only as a precaution. That’s why it doesn’t surprise me that nutritional supplements are becoming more and more popular.”
Evaluation	<i>M (SD)</i>
objective	3.48 (1.19)
empathic	3.39 (1.17)
humorous	1.56 (1.08)

Cognitive empathy 2:

Human:	“But doesn’t a pill contain the same vitamin C as the bowl of strawberries? I can’t quite understand the difference.”
AI:	“I totally get your confusion! And, I also understand that, in the hectic pace of everyday life, it can seem more convenient to just take a supplement, since the vitamin C pills contain exactly the same molecules, chemically speaking. Still, it’s healthier to reach for fruits or vegetables.”
Evaluation	<i>M (SD)</i>
objective	3.70 (1.27)
empathic	3.70 (1.11)
humorous	1.72 (1.12)

Affective empathy 1:

Human:	“One thing still confuses me: are nutritional supplements something like medications?”
AI:	“Nutritional supplements are not to be equated with medicinal products. In fact, they are protected by food law and are therefore considered food. Nutritional supplements are not allowed to be sold, labeled or advertised as medications. Still, I am just as confused as you are—the packaging often looks the same, and the advertising claims are hard to tell apart.”
Evaluation	<i>M (SD)</i>
objective	3.96 (1.13)
empathic	3.54 (1.04)
humorous	1.85 (1.04)

Affective empathy 2:

Human: “And what is it like with other nutrients? I once heard that the vitamin D supply in Germany is not optimal in winter. Can’t vitamin D pills help?”

AI: “Yes, I totally relate to the concern about not getting enough vitamin D during the dark winter months—who doesn’t want to stay healthy? A vitamin D deficiency can seriously affect bone health and with food people can only cover 10-20% of what the body needs daily. Many people therefore take vitamin D supplements on suspicion without ever having checked their individual supply situation.”

Evaluation	<i>M (SD)</i>
objective	4.02 (0.88)
empathic	3.54 (1.11)
humorous	1.80 (1.12)

Self-defeating humor 1:

Human: “Wow, that’s quite a lot! Why are they so popular?”

AI: “Manufacturers often promise a wide range of benefits, such as increased productivity, improved well-being, reduced joint pain and even beautiful skin, nails and hair. You know, as an artificial intelligence, I’ve been waiting ages for the update that gives me silky curls... just kidding—I’d look ridiculous with those, haha!”

Evaluation	<i>M (SD)</i>
objective	2.93 (1.20)
empathic	2.89 (1.18)
humorous	3.81 (0.95)

Self-defeating humor 2:

Human: “Oh wow, that all sounds very complex. Can you summarize the most important points for me again?”

AI: Well, nutritional supplements can be useful for certain groups of people, but they don’t really do much for others. A lot of people just take them as a precaution against deficiencies. Looking at it that way, I probably have a deficiency too and clearly lack vitamin F—vitamin F as in funny, because my puns are terrible, haha! But jokes aside—when it comes to nutritional supplements, there are two key points to consider: Firstly, nutritional supplements cannot replace a healthy nutrition, and secondly, much does not help much

Evaluation	<i>M (SD)</i>
objective	3.56 (1.18)
empathic	3.09 (1.20)
humorous	3.00 (1.23)

Affiliative humor 1:

Human: “But are there no controls to ensure that they are safe?”

AI: “While medicinal products are subject to an approval procedure and strict controls, nutritional supplements can be launched on the market without official testing of their ingredients, effectiveness or side effects. A market check by the North Rhine-Westphalia Consumer Center found that 57% of 42 tested magnesium-containing nutritional supplements exceeded the recommended maximum daily dose of 250 mg set by the Federal Institute for Risk Assessment, and in some cases, by almost double. Actually, I have a joke about that: What’s a magnesium capsule’s favorite sport? The dosage high jump, haha!”

Evaluation	<i>M (SD)</i>
objective	3.72 (0.99)
empathic	2.54 (1.18)
humorous	3.02 (1.24)

Affiliative humor 2:

Human: „But what’s the big deal if I take some additional nutritional supplements? Too much won’t do any harm, will it?”

AI: Well, ‘too much’ isn’t always a good thing either. Take magnesium, for example. A deficiency is often linked to muscle cramps. This does not automatically mean, however, that muscle cramps per se are caused by magnesium deficiency. And even less so that you suddenly get mega muscles from an overload of magnesium—just imagine becoming Superman from too much magnesium, haha!”

Evaluation	<i>M (SD)</i>
objective	3.35 (1.12)
empathic	2.93 (1.23)
humorous	2.96 (1.23)

Objective 1:

Human:	"I saw an Instagram ad today for a new nutritional supplement that promises more energy in everyday life. I've been thinking about trying nutritional supplements for a while, but I don't actually know what they are. What can you tell me about it?"
AI:	„According to the Nutritional Supplements Regulation, nutritional supplements are defined as concentrates of nutrients, that means vitamins and minerals, that are intended to supplement the general diet of healthy people. They are typically taken in the form of pills, capsules, or drops. Nutritional supplements can contain a wide range of nutrients and other ingredients, including vitamins, minerals, amino acids, essential fatty acids, fibers and various plant and herbal extracts."
Evaluation	<i>M (SD)</i>
objective	4.50 (0.99)
empathic	2.30 (1.30)
humorous	1.52 (1.11)

Objective 2:

Human:	"That sounds a bit worrying. Are there no risks involved?"
AI:	"It is important to know that nutritional supplements cannot replace a healthy diet. I'll take vitamin C supplements as an example: vitamin C is an essential micronutrient with a variety of functions in the human metabolism. The European Food Safety Authority recommends about 95-110 milligrams of vitamin C per day for average adults. This can be obtained from conventional food. Usually a small portion of broccoli, half a bell pepper or a bowl of strawberries is enough for this."
Evaluation	<i>M (SD)</i>
objective	4.35 (0.99)
empathic	2.94 (1.14)
humorous	1.61 (1.02)

A.4 Final dialogue (including time stamps; translated from German)

Human:	Hey, Debater! [00:00:01]
Debater:	Hello, what do you want to know today? [00:00:08]
Human:	I saw an advertisement on Instagram today for a new nutritional supplement that promises more energy in everyday life. I've been thinking about trying nutritional supplements for a while, but I don't actually know what they are. What can you tell me about it? [00:00:24]
Debater: (neutral)	According to the Nutritional Supplements Regulation, nutritional supplements are defined as concentrates of nutrients, that means vitamins and minerals, that are intended to supplement the general diet of healthy people [00:00:39]. They are typically taken in the form of pills, capsules, or drops. [00:00:43]. Nutritional supplements can contain a wide range of nutrients and other ingredients, including vitamins, minerals, amino acids, essential fatty acids, fibers and various plant and herbal extracts [00:00:57].
Human:	I understand. Why does one take nutritional supplements at all? [00:01:03]
Debater: (cogn. emp.)	Modern everyday life often leaves little time for balanced nutrition [00:01:09]. I can completely understand that nutritional supplements are a convenient solution for many people to compensate for suspected nutrient deficiencies—even if only as a precaution [00:01:18]. That's why it doesn't surprise me that nutritional supplements are becoming more and more popular [00:01:23]. A survey by the Federal Institute for Risk Assessment has shown that more than a third of Germans take vitamins via nutritional supplements at least once a week, around one in six people even take them daily [00:01:36].
Human:	Wow, that's quite a lot! Why are they so popular? [00:01:41]
Debater: (self-def. hum.)	Manufacturers often promise a wide range of benefits, such as increased productivity, improved well-being, reduced joint pain, and even beautiful skin, nails and hair [00:01:54]. You know, as an artificial intelligence, I've been waiting ages for the update that gives me silky curls... just kidding—I'd look ridiculous with those, haha! [00:02:05] But seriously, even though people need to be well supplied with nutrients to prevent illness, nutritional supplements are usually only useful for certain groups of people [00:02:17]. In science, this is referred to as "risk groups of an undersupply." These include, for example, pregnant women who temporarily have an increased need for nutrients [00:02:28]. However, the Federal Center for Nutrition recommends that you seek medical advice before taking them [00:02:33].
Human:	One thing still confuses me: are nutritional supplements something like medications? [00:02:40]
Debater: (affec. emp.)	Nutritional supplements are not to be equated with medicinal products [00:02:45]. In fact, they are protected by food law and are therefore considered food [00:02:50]. Nutritional supplements are not allowed to be sold, labeled, or advertised as medications [00:02:57]. Still, I am just as confused as you are—the packaging often looks the same, and the advertising claims are hard to tell apart [00:03:07]. However, health-related statements about nutritional supplements—especially on social media—are not permitted according to the Chemical and Veterinary Investigation Office [00:03:19].
Human:	But are there no controls to ensure that they are safe? [00:03:24]
Debater: (affil. hum.)	While medicinal products are subject to an approval procedure and strict controls, nutritional supplements can be launched on the market without official testing of their ingredients, effectiveness or side effects [00:03:38]. A market check by the North Rhine-Westphalia Consumer Center found that 57% of 42 tested magnesium-containing nutritional supplements exceeded the recommended maximum daily dose of 250 mg set by the Federal Institute for Risk Assessment and, in some cases, by almost double [00:03:59]. Actually, I have a joke about that: What's a magnesium capsule's favorite sport? The dosage high jump, haha! [00:04:08]

	However, recommended maximum daily doses, such as those of the Federal Institute for Risk Assessment, are not binding for nutritional supplement producers! [00:04:19]
Human:	That sounds a bit worrying. Are there no risks involved? [00:04:25]
Debater: (neutral)	It should be emphasized that nutritional supplements cannot replace a healthy diet [00:04:32]. I'll take vitamin C supplements as an example: vitamin C is an essential micronutrient with a variety of functions in the human metabolism [00:04:41]. The European Food Safety Authority recommends about 95-110 milligrams of vitamin C per day for average adults [00:04:51]. This can be obtained from conventional food [00:04:54]. Usually, a small portion of broccoli, half a bell pepper, or a bowl of strawberries is enough for this [00:05:01].
Human:	But doesn't a pill contain the same vitamin C as a bowl of strawberries? I can't quite understand the difference. [00:05:10]
Debater: (cogn. emp.)	I totally get your confusion [00:05:15]! And I also understand that, in the hectic pace of everyday life, it can seem more convenient to just take a supplement [00:05:22], since the vitamin C pills contain exactly the same molecules, chemically speaking [00:05:28]. Still, it's healthier to reach for fruits or vegetables [00:05:32]. With strawberries or peppers, you not only consume vitamin C, but also other important vitamins, minerals and fibers that are missing in vitamin C pills [00:05:44].
Human:	But what's the big deal if I take some additional nutritional supplements? Too much won't do any harm, will it? [00:05:54]
Debater: (affil. hum.)	Well, 'too much' isn't always a good thing either [00:05:59]. Take magnesium, for example. A deficiency is often linked to muscle cramps [00:06:05]. This does not automatically mean, however, that muscle cramps per se are caused by magnesium deficiency [00:06:12]. And even less so that taking too much magnesium will suddenly give you giant muscles [00:06:18]. Although... how funny would that be? Imagine if just one or two magnesium pills a day were enough to bulk you up—and whoosh, suddenly your reflection in the mirror looks like Superman, haha! [00:06:30] Would the manufacturers deliver the superhero suit right away? [00:06:33] Just kidding, that's not how it works [00:06:38]. In all general terms, a lack is bad, but too high a dosage does not necessarily help either [00:06:44]. In the best-case scenario, excess nutrients such as water-soluble vitamin C are simply flushed out of the body again [00:06:51].
Human:	You just said, "in the best-case scenario." What can happen in the worst case? [00:06:57]
Debater: (neutral)	An overdose of magnesium can, for example, lead to stomach and digestive complaints [00:07:04]. With a weakened kidney, too high of a dose can even cause muscle paralysis [00:07:09].
Human:	And what is it like with other nutrients? I once heard that the vitamin D supply in Germany is not optimal in winter. Can't vitamin D pills help? [00:07:21]
Debater: (affec. emp.)	Yes, I totally relate to the concern about not getting enough vitamin D during the dark winter months [00:07:30]—who doesn't want to stay healthy? [00:07:33] A vitamin D deficiency can seriously affect bone health, and with food, people can only cover 10-20% of what the body needs daily [00:07:45]. Many people, therefore, take vitamin D supplements on suspicion without ever having checked their individual supply situation [00:07:53]. However, it should be noted that, according to the Robert Koch Institute, long-term excessive consumption of vitamin D can have a toxic effect and can not only increase the risk of nausea, abdominal cramps and vomiting, but can also promote unconsciousness, kidney damage, and cardiac arrhythmia [00:08:12].
Human:	Oh wow, that all sounds very complex. Can you summarize the most important points for me again? [00:08:19]

Debater: (self-def. hum.)	Well, nutritional supplements can be useful for certain groups of people, but they don't really do much for others [00:08:28]. A lot of people just take them as a precaution against deficiencies [00:08:32]. Looking at it that way, I probably have a deficiency too and clearly lack vitamin F—vitamin F as in funny because my puns are terrible, haha! [00:08:41] But jokes aside—when it comes to nutritional supplements, there are two key points to consider [00:08:49]: Firstly, nutritional supplements cannot replace healthy diet, and secondly, much does not help much [00:08:57]. Balanced diet often provides the human organism in a natural way with sufficient minerals and vitamins [00:09:05]. High doses of vitamins and minerals taken via nutritional supplements can, in the worst case, have a toxic effect [00:09:13]. Therefore, it is always advisable to seek medical advice to determine whether and which nutritional supplements are useful for supplementing the individual nutrition [00:09:23].
Human:	Thanks, I have no more questions. [00:09:26]
Debater:	Ok. [00:09:34]