

# Neuroenhancement – perspectives of Swiss psychiatrists and general practitioners

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## Summary

**QUESTIONS UNDER STUDY:** Although the ethical and health implications of neuroenhancement have been intensely discussed over the past years, little is known about the experiences and attitudes of physicians confronted with requests for neuroenhancing substances. The aim of this study was to explore general practitioners' and psychiatrists' familiarity with such requests and their willingness to prescribe these products.

**METHOD:** A nation-wide cross-sectional survey among general practitioners and psychiatrists in Switzerland was conducted. A questionnaire was developed, pre-tested and sent out to a pre-defined sample of 1,600 Swiss practising physicians in the fields of psychiatry and general practice/internal medicine in the German-speaking and French-speaking part of Switzerland.

**RESULTS:** A total of 393 questionnaires were returned (response rate: 24.7%). 80.2% of study participants were encountered requests for neuroenhancing products in their own practice, mostly not exceeding 1–2 times a year. A total of 41.1% were undecided when asked if they categorically against neuroenhancement, 49% would decide on a case-by-case basis, and 9.6% would decide according to patients' wishes.

**CONCLUSIONS:** Swiss psychiatrists and general practitioners are confronted with requests for neuroenhancement, albeit not very frequently. Most participants embrace a pragmatic position towards neuroenhancement, although there is also a considerable degree of uncertainty about the appropriateness of a categorical refusal. A minority would follow a consumer model that leaves the decision about the use of neuroenhancers to the client, even though this conflicts with legal requirements regarding drug prescriptions.

**Key words:** neuroenhancement; ethics; survey; physicians; attitudes

## Introduction

Neuroenhancement – in the sense of improving cognitive and emotional capacities through pharmacological substances in healthy humans – is an intensely discussed topic in medical ethics [1–5]. Issues at stake in the debate about neuroenhancement (NE) are the autonomy of users and the

moral impetus to develop our full human potential versus concerns about justice, solidarity in an increasingly competitive and demanding society, and safety. The latter is of particular concern given that long-term side effects of available putative neuroenhancers such as methylphenidate and modafinil have not yet been investigated in healthy humans [1].

At the same time there are few empirical data on (potential) users [6–10] and even less on (potential) providers [4, 11, 12]. Some recent studies have investigated the perspectives of physicians from the US [4] and from Canada and the US [12], but to date there are no corresponding data on Switzerland. Although it is often claimed in the media that there is an epidemic of neuroenhancing drug use, we do not know how frequently physicians actually encounter such requests and how they deal with them. Certainly not all neuroenhancers will be obtained through physicians. Still, taking into account the perceptions and perspectives of physicians, who are potentially confronted with requests for neuroenhancers in their daily work and who need to make decisions on whether or not to prescribe the respective drug, is of key relevance to a debate that is not supposed to be purely theoretical but based on clinical realities.

The aim of this study was to explore general practitioners' and psychiatrists' attitudes towards NE, their familiarity with requests for such products as well as their willingness to prescribe them.

## Methods

### Development of the questionnaire

In preparation of the questionnaire eight qualitative, half-standardised interviews were conducted. Four practising psychiatrists and four general practitioners in the region of Zurich were interviewed. The interviews aimed to obtain a sense of the degree of physicians' familiarity with NE and to explore ways to frame items and possible answers so that they would make sense to participants. The interviews were transcribed and analysed with the Software MaxQda2 for Windows programme (Berlin-Marburg-Amöneburg, Germany; see [www.maxqda.com](http://www.maxqda.com)), using the method of inductive formation of categories according to Mayring [13]. The results were incorporated into the development of items for the pilot questionnaire, which was sent to 48 randomly se-

lected persons from the main sample. The feedback and the results of the ten returned questionnaires (20.8%) were used to produce the final version of the questionnaire.

The procedures of the survey were in accordance with the ethical standards of a research ethics committee and with the Helsinki declaration.

### Questionnaire

The questionnaire starts with demographic data as well as questions about the term “neuroenhancement” (the German or French questionnaires can be made available by the authors upon request). The following items address participants’ concepts of disease and treatment. After these initial questions a definition of the term “neuroenhancement” is presented, to which the remainder of the questionnaire refers: “Neuroenhancement stands for the improvement (‘optimisation’) of cognitive and emotional abilities of healthy humans through pharmacological substances. The most discussed substances are methylphenidate (Ritalin<sup>®</sup>), modafinil (Modasomil<sup>®</sup>, Provigil<sup>®</sup>), antidepressants and anti-dementia drugs, although with different clinical effectiveness [7, 14]. There are also some additional substances, which are potential therapeutic agents for diseases, and which are still in the experimental phase.” The subsequent part of the questionnaire contains four case scenarios, which were chosen to represent clinically relevant requests for the most frequently used neuroenhancing products:

1. A student will soon take his two last and decisive exams. If he is successful, he will obtain his degree and a well-paid position. If not, he cannot proceed with his studies and will have to leave the university. He has already had to repeat some exams, due to difficult personal circumstances. After a time of intense exam preparations, he asks his doctor for a drug to diminish his need for sleep so that he can use the scarce remaining time as efficiently as possible.

2. For several weeks, a single mother-of-two has cared for her terminally ill mother at home and has become completely exhausted. However, she does not want to place her mother in a care institution because she expects that she will not live much longer. The mother had supported her during her divorce and she would like to return the favour. She asks her physician for a stimulant so she can keep up with her workload for a longer time.

3. A 24 year-old woman, who is shy and has low self-esteem around men wants to get rid of her inhibitions. She asks her physician for a drug that can reduce her anxiety. A female friend of hers is taking a drug for social phobia, and she would also like to try this drug.

4. A renowned scientist, who has just come back from a business trip, is suffering from jet lag and wants a prescription for modafinil as he wants to be back at his normal performance level as soon as possible, as he is attending a conference in the near future. He asks his family doctor to prescribe an appropriate stimulant.

The case scenarios are followed by questions about whether the participants have encountered such situations and, if so, about how they handled them, or, if not, would handle them. The remaining questions explored their personal attitudes to NE and their knowledge about the possible side effects of certain neuroenhancers. These cases do not merely

capture medical aspects, but contain strong psychosocial components with a kind of “moral appeal” to the (imaginary) treating physician.

### Sample

The questionnaire was designed to provide insights into the attitudes, routine practice and knowledge that practising physicians have of NE. Psychiatry and general practice were chosen as the specialities which would have the largest number of requests for neuroenhancers, as it is within these specialities that Ritalin<sup>®</sup> (methylphenidate), a key substance in the neuroenhancement debate, is mostly prescribed [15]. Differences that could be correlated to gender, speciality, clinical experience and language (German/French) were of interest to the analysis. As requested by the working group “Human Enhancement” of the Swiss Academies of Sciences, which had commissioned the study, the sample size was constructed with an equal distribution of all independent variables in order to facilitate such comparisons and at the same time keep it as small as possible. According to Bortz the preconditions of a variance analysis, like a normal distribution or the demand of a homogeneous sample variance, can be neglected if the subgroups contain more than ten members [16]. The sample was defined in such a way as to include 100 persons for each of the 16 combinations of gender (male, female), specialist training (psychiatrist, GP and others), number of working years (1–10, >10) and language (German, French).

The survey was conducted between July and October 2011. The questionnaire was sent out twice to 1600 Swiss practising physicians in the fields of psychiatry and general practice/internal medicine. Addresses were obtained through the Swiss Medical Association (Foederatio Medicorum Helveticorum). With the second mailing, a book voucher (20 CHF) was offered to those considering participation in the study. A total of 800 of the addressees were in the French part of Switzerland, while the other half were located in the German-speaking part of Switzerland. Due to relocation the number of persons who were reached by mailing was reduced to 1589.

To eliminate double participation, a specific code was assigned to each participant, containing the first two letters of their first and last names and their date of birth.

### Analysis

Analyses were performed using SPSS version 19 for Mac. We used univariate descriptive statistics to examine the distribution for the items of each question. Next to that were cross tables generated to identify the responses of the physicians in more than one questionnaire. Pearson’s chi-square was performed to test if the distributions among the items were significantly different or, in relation to cross tables, whether there was a relationship between two categorical variables ( $p < 0.05$ ). Cramer’s V was performed to test the strength of association between two categorical variables [17]. Subgroup analyses including Pearson’s chi-square revealed if different responses were given according to language (German/French), gender, speciality (psychiatry/general practice) and work experience (0–10 years / >10 years).

## Results

A total of 393 questionnaires were returned (response rate 24.7%). 14 questionnaires had to be removed either because of the large amount of missing values ( $n = 4$ ) or because they were likely to have been sent in twice by participants after the reminder ( $n = 10$ ), leaving 379 questionnaires for the analysis (23.9%).

In the sample, 196 persons (52.1%) were male and 180 (47.9%) were female ( $n_{Total} = 376$ ). The average year of birth was 1953, with a range from 1942–1979. After the first mailing, 155 questionnaires from German speakers and 99 questionnaires from French speakers were returned (67.0%;  $n_{Total} = 379$ ). After the second mailing, an additional 64 German and 61 French questionnaires were received. Of these 125 persons who responded to the second mailing, 62 asked for the book voucher. This means that only half of the participants (49.6%) to whom a book voucher was offered took advantage of this offer.

In the sample, 208 persons specialised in “psychiatry and psychotherapy”, 116 in “general medicine”, 65 in “internal medicine” and a total of four persons had another speciality title. A total of 19 persons specialised in two fields ( $n_{Total} = 374$ ). On average, participants had been working for 14.8 years in private practice (standard deviation: 9.7,  $n_{Total} = 362$ ). The work environment was ‘rather rural’ for 32.7% of the physicians and “rather urban” for 67.3% ( $n_{Total} = 370$ ).

### Knowledge of term and immediate response

Regarding the question “Do you know the term neuroenhancement?”, the majority of the respondents chose the answer “no” (68.9%,  $n_{Total} = 376$ ). The term “brain doping” was better known among the participants and 53.6% of the respondents indicated that they knew this term ( $n_{Total} = 371$ ).

Table 1 shows the responses of participants confronted with five statements about media reports on the increasing use of performance-enhancing products among students and employees.

All five statements were chosen by more than 50% of the sample. However, only eight of the participants affirmed all five statements and relatively high values were documented in the category “undecided”.

### Concepts of disease and treatment

When asked which criteria participants would use for determining whether a dysfunction should be considered a disease, “subjective suffering” was the most frequently chosen criterion, followed by “negative consequences for everyday ability to work” (table 2).

When asked how they would decide if a patient asked for a prescription without an indication, the majority of the participants (67.0%,  $n = 250$ ;  $n_{Total} = 373$ ) chose the answer: “In general, I do not prescribe anything without an indication. However, if subjective suffering is strong and the patient wants to try whatever is possible, I might prescribe something without a clear indication. This depends on the substance and its contraindications and undesired side effects.” A total of 28.4% of the participants ( $n = 106$ ) answered: “Without indication I do not prescribe anything.” Only a minority of the participants (4.6%,  $n = 17$ ) chose to reply: “I inform the patient concerning the possible risks of a desired drug and when she/he still wants it, she/he should be free to try it.”

In the question about which medication participants would prescribe without a clear indication, in response to a patient’s request, antidepressants were chosen from a list with 11 items by 13.3%, ranking fifth after NSAIDs (21.6%), Viagra (20.3%), laxatives (17.6%) and benzodiazepines (13.6%). The other six options (neuroleptic drugs (5.5%), antibiotics (4.9%), opioids (1.9%) and three potential neuroenhancers – anti-dementia drugs (5.0%), methylphenidate (2.5%) and modafinil (2.0%)) – were only chosen by a small minority.

### The case scenarios

Participants were confronted with the four case scenarios described above. The introduction of each scenario was followed by questions about which substances they would

**Table 1:** Which of the following statements come(s) closest to your own spontaneous reaction to the increasing use of performance enhancing drugs (multiple answers possible)?

	Yes, <i>n</i> (%)	No, <i>n</i> (%)	Undecided, <i>n</i> (%)	<i>n</i> <sub>Total</sub>
Hardly surprising that this is happening when demands and competitive pressure continue to rise.	<b>228 (62.5)</b>	66 (18.1)	71 (19.5)	365
One should put a stop to these things.	<b>183 (51.8)</b>	57 (16.1)	113 (32.0)	353
Everybody is responsible for his/her own actions.	<b>212 (58.6)</b>	68 (18.8)	82 (22.7)	362
People have always tried to improve their performance. Coffee and Red Bull are already around, it’s just that the range of possibilities is increasing.	<b>234 (65.0)</b>	62 (17.2)	64 (17.8)	360
This is as wrong as doping in sports.	<b>194 (53.7)</b>	90 (24.9)	77 (21.3)	361

The highest value for each criterion is in bold letters. The numbers of the three answer categories differ significantly for all five reactions ( $p = 0.000$ ).

**Table 2:** When you have to decide whether a dysfunction has disease value – what criteria are decisive for you (multiple answers possible)?

	Yes, <i>n</i> (%)	No, <i>n</i> (%)	Sometimes, <i>n</i> (%)	<i>n</i> <sub>Total</sub>
Subjective suffering	<b>317 (83.6)</b>	8 (2.1)	50 (13.2)	375
Classification according to ICD / DSM	<b>165 (43.5)</b>	93 (24.5)	100 (26.4)	358
Objectification with laboratory / visual methods	<b>165 (43.5)</b>	70 (18.5)	117 (30.9)	352
Negative consequences for everyday ability to work	<b>290 (76.5)</b>	11 (2.9)	65 (17.2)	366

The highest value for each criterion is in bold letters. The numbers of the three answer categories differ significantly for all four criteria ( $p = 0.000$ ).

prescribe (if any) and if they had received such requests in their clinical practice.

As answers to the first question, about how participants would act, four statements were offered (table 3). The statement – “I would only prescribe drugs if psychotherapeutic methods or comparable measures were not helpful enough” – was the most popular overall. It was endorsed by most of the participants for the third case scenario concerning the shy woman and had least support in the case of the renowned scientist asking for modafinil.

The statement: “I would prescribe a drug like Ritalin<sup>®</sup>, Modasomil<sup>®</sup>, antidepressants or anti-dementia drugs” was rejected by the majority of participants. However about one third would hand out a prescription to the shy woman and about a quarter to the single mother. Opinions were divided about the statement; “I principally prescribe no drugs in such situations”; it had least support in the case of the single mother and the shy woman. The statement – “I do not prescribe drugs in such situations, but refer to the possibility that the patient could consult some of my other colleagues or order via the Internet” – was overwhelmingly rejected by participants.

Most of the participants who would prescribe a drug in the first scenario chose beta blockers (table 4), followed by antidepressants and Ritalin<sup>®</sup> (methylphenidate). In the second and third case scenarios, the majority chose antidepressants. Modasomil<sup>®</sup> (modafinil) was selected by most of the participants who would prescribe a drug in the fourth case scenario. Overall, antidepressants were by far the most frequently chosen drugs.

The next question turned from hypothetical questions to an exploration of whether participants had in fact been confronted with requests for enhancing products in their clinical practice (table 5).

Whereas the “student” and the “shy woman” had been encountered by about half of participants, slightly fewer participants had been confronted with the single mother case and only about one fifth with the renowned scientist scenario. 10.0% of the participants (n = 32) knew all scenarios, in contrast to 19.8% who had not experienced any of them (n = 63). The subgroup analysis according to work environments showed that the “shy woman” scenario had been experienced by 23.7% of participants with a “rather rural” surrounding, compared to 76.3% of those practising in a “rather urban” setting ( $\chi^2(n = 333) = 13.911, p = 0.000$ ). This association between experience of the third scenario and the environment is small (Cramer’s V = 0.2). The frequency of requests was reported to be rather low, in most cases 1–2 times per year for scenario 1–3 and “very rarely” for scenario 4. 80.2% of the participants have experienced at least one of the four case scenarios.

### Personal attitudes

In terms of their personal attitudes towards NE, the majority of participants were unsure if they would count themselves among those who principally oppose NE. At the same time, half of the sample would consider the decision for or against NE in the light of specific circumstances. Less than 10% would embrace a consumer model, with medical decisions guided by patient preferences (table 6). In order to reach a better understanding of physicians’ decisions for or against prescribing performance-enhancing drugs, participants were confronted with different possible criteria (table 7). The criteria were developed from preparatory interviews with physicians.

The data in table 7 show that only the first three statements on (1.) subjective suffering, (2.) the time-limited use of

**Table 3:** How would you react to a request for the prescription of a neuroenhancing substance?

	Prescription	Only if no therapeutic alternative	No prescription	Referral
Scenario 1: student	49 (15.3)	<b>180 (54.4)</b>	161 (49.2)	24 (7.8)
Scenario 2: single mother	83 (25.6)	<b>176 (52.9)</b>	<b>137 (41.4)</b>	<b>14 (4.5)</b>
Scenario 3: shy woman	107 (32.7)	<b>244 (70.1)</b>	<b>88 (26.8)</b>	<b>19 (6.1)</b>
Scenario 4: renowned scientist	54 (16.5)	<b>52 (16.1)</b>	<b>193 (54.1)</b>	<b>35 (10.7)</b>

The possible answers were “yes” and “no”; the table contains the values for the answer “yes”.  $n_{Total}$  ranges between 307 and 357 due to missing values.

**Table 4:** In case of drug prescription in the last question: which of the following substances would you prescribe in the described situation (multiple answers possible)?

	Ritalin <sup>®</sup> (methylphenidate)	Modasomil <sup>®</sup> (modafinil)	Antidepressants	Anti-dementia drugs	Beta blockers	$n_{Total}$
Scenario 1: student	21 (11.7%)	5 (2.9%)	23 (12.7%)	1 (0.6%)	<b>56 (29.6%)</b>	205
Scenario 2: single mother	6 (3.4%)	1 (0.6%)	<b>72 (37.3%)</b>	1 (0.6%)	13 (7.5%)	206
Scenario 3: shy woman	3 (1.4%)	1 (0.5%)	<b>110 (43.8%)</b>	1 (0.5%)	17 (7.8%)	273
Scenario 4: renowned scientist	6 (8.6%)	<b>24 (32.4%)</b>	7 (9.9%)	1 (1.4%)	5 (7.1%)	89

The highest value is marked for each scenario. The column “ $n_{Total}$ ” refers to all participants who had indicated in the previous question that they would prescribe a drug.

**Table 5:** Do you know of such requests from your own work?

	Yes, n (%)	No, n (%)	$n_{Total}$	p-value
Scenario 1: student	200 (53.5)	174 (46.5)	374	0.179
Scenario 2: single mother	156 (42.0)	<b>215 (58.0)</b>	371	0.002**
Scenario 3: shy woman	180 (52.9)	160 (47.1)	340	0.278
Scenario 4: renowned scientist	75 (21.7)	<b>270 (78.3)</b>	345	0.000***

The p-values of the  $\chi^2$ -test are noted in the last column.

(\* $0.01 \leq p < 0.05$ ); \*\*( $0.001 \leq p < 0.01$ ); \*\*\*( $p < 0.001$ ). If the values differ significantly ( $p < 0.05$ ), the higher value is in bold letters.

the drug and (3.) avoiding the development of something worse were relevant for the majority of participants.

Finally, participants were asked to consider three statements on NE (table 8). The majority considered the statement that NE is a matter of individual conscience as fairly or completely right. About a quarter were uncertain if NE should become an integral part of medicine, with the remainder agreeing or disagreeing in equal measure. Additionally, the majority thought that physicians' public image and trust would suffer if they moved away from the core business of treating sick people.

Subgroup analyses according to language (German/French), gender, speciality title (psychiatry/general practice) and work experience (0–10 years / >10 years) revealed some differences ( $\chi^2$ -Test with a  $p$ -value <0.05) regarding the participants' personal attitudes. For example, French-speaking participants rated the criterion of subjective suffering for prescribing neuroenhancers higher (item 1 of table 7;  $p = 0.012$ , Cramer's  $V = 0.14$ ), while German speakers and general practitioners gave more weight to the importance and value of the reason for the request to enhance (item 5 of table 7;  $p = 0.000$ , Cramer's  $V = 0.32$ ). Women were more concerned about an erosion of patient

trust (third statement of table 8;  $p = 0.011$ , Cramer's  $V = 0.19$ ).

At the end of the questionnaire, the physicians were asked to select possible side effects to healthy people from antidepressants, Ginkgo, methylphenidate (Ritalin<sup>®</sup>), anti-dementia drugs and modafinil (Modasomil<sup>®</sup>) from a list; ( $n_{\text{Total}} = 379$ ). The two most frequently chosen answers were: for antidepressants, nervousness/sleep disorders (64.1%) and liver dysfunction (41.4%); for Ginkgo, none (39.3%) and nervousness/sleep disorders (7.1%); for methylphenidate (Ritalin<sup>®</sup>), nervousness/sleep disorders (63.9%) and addiction (47.8%); for anti-dementia drugs, nervousness/sleep disorders (18.2%) and liver dysfunction (15.3%); for modafinil (Modasomil<sup>®</sup>), nervousness/sleep disorders (22.2%) and arrhythmia (11.6%). The percentage of those who did not choose any of the answers were 12.9% for antidepressants, and 43.0% for Ginkgo, 26.1% for methylphenidate (Ritalin<sup>®</sup>), 63.1% for anti-dementia drugs, and 68.3% for modafinil (Modasomil<sup>®</sup>).

**Table 6:** Personal attitude.

	I agree, n (%)	Undecided, n (%)	I do not agree, n (%)	$n_{\text{Total}}$	$p$ -value
As a physician, I refuse NE and would never prescribe such substances.	108 (30.6)	<b>145 (41.1)</b>	100 (28.3)	353	0.007**
A decision for or against NE is context-dependent: I do not categorically say no.	<b>171 (49.0)</b>	87 (24.9)	91 (26.1)	349	0.000***
When the patient is informed about the side effects and risks of the desired drugs but still wants it, I respect this decision and prescribe the drug.	33 (9.6)	94 (27.3)	<b>217 (63.1)</b>	344	0.000***

The  $p$ -values of the  $\chi^2$ -test are written in the last column.  
\*(0.01 ≤  $p$  < 0.05); \*\*(0.001 ≤  $p$  < 0.01); \*\*\*( $p$  < 0.001). If the values differ significantly ( $p$  < 0.05), the higher value is in bold letters.

**Table 7:** Which criteria influence your decision regarding the prescription of drugs in the different scenarios (multiple answers possible)?

	Yes, n (%)	No, n (%)	$n_{\text{Total}}$	$p$ -value
The subjective suffering is intense.	<b>294 (88.3)</b>	39 (11.7)	333	0.000***
Rather for temporary use than for an undefined time span.	<b>275 (82.8)</b>	57 (17.2)	332	0.000***
To avoid a development that would be worse.	<b>233 (75.6)</b>	75 (24.4)	308	0.000***
When the person concerned did not provoke the situation she or he is in.	80 (26.0)	<b>228 (74.0)</b>	308	0.000***
Whether the goal is obviously important and valuable or does also benefit others.	90 (30.9)	<b>201 (69.1)</b>	291	0.000***
When it is clear that the person concerned tried hard enough to reach the goal through his or her own efforts.	144 (46.5)	166 (53.5)	310	0.211

The  $p$ -values of the  $\chi^2$ -test are written in the last column.  
\*(0.01 ≤  $p$  < 0.05); \*\*(0.001 ≤  $p$  < 0.01); \*\*\*( $p$  < 0.001). If the values differ significantly ( $p$  < 0.05), the higher value is in bold letters.

**Table 8:** Please evaluate the following statements.

Statements	Completely wrong, n (%)	Fairly wrong, n (%)	Undecided, n (%)	Fairly right, n (%)	Completely right, n (%)
Every physician should decide for her-/ himself, whether she/he wants to practice NE or not.	29 (7.9)	75 (20.4)	63 (17.2)	<b>110 (30.0)</b>	90 (24.5)
Neuroenhancement measures are a reality. Given this fact they should become part of medical practice for the benefit of those who wish to use them. This way the assessment and surveillance of risks and undesired side effects can be guaranteed.	43 (12.1)	89 (25.1)	83 (23.4)	<b>99 (27.9)</b>	41 (11.5)
The public perception of physicians will be damaged and trust of patients decrease if physicians move away from the core activity of treating disease.	14 (3.9)	58 (16.0)	56 (15.5)	<b>156 (43.1)</b>	78 (21.5)

## Discussion

### Participants' familiarity with the term and experience of requests for NE

More than two-thirds of responding general physicians and psychiatrists did not know the term "neuroenhancement". More than half had not heard of "brain doping". This is surprising considering that the topic is extensively discussed in the public press nowadays. However, when the four case scenarios were described, more than 50% had had experience of situations similar to those of the student or the shy woman in their own medical practice, followed in frequency by the overburdened single mother (42.0%) and the exhausted scientist (21.7%; table 5). This finding shows that many participants may not be very familiar with the public discussion of the phenomenon, but can identify comparable situations from their own practice. A significant number of physicians are confronted "very rarely" or up to twice a year with such requests and only a minority of the sample have patients who ask for cognitive enhancement weekly or monthly. Not surprisingly, certain requests for NE are more frequent in a "rather urban" setting (76.3%) in comparison to a "rather rural" one (23.7%), which might be due to a more competitive environment, higher expectations regarding cognitive and psychosocial functioning in urban workplaces and easier access to information about neuroenhancers.

### Attitudes towards NE measures

It is interesting to note that although almost half of the participants declared they would as a matter of principle not prescribe any drugs in cases such as the case scenarios, between 15 and 33% would have prescribed a drug like Ritalin<sup>®</sup> (methylphenidate), Modasomil<sup>®</sup> (modafinil), antidepressants or anti-dementia drugs. In fact, in the absence of a therapeutic alternative, most respondents would prescribe a drug, except for the case of the jet-lagged scientist. Overall, antidepressants were mentioned most frequently as the substances that would have been prescribed. There may be less hesitation to prescribe if physicians have long-standing experience with a drug and if the case is similar to a condition that can be classified as a disease, such as social phobia in the case of the shy woman. The other case scenarios – the student who did not prepare in time for his exam, the exhausted mother and the jet-lagged scientist – are all rather far removed from a pathological diagnosis. Most participants (67%) had a rather pragmatic attitude towards NE; although in general they do not prescribe without an indication, they would consider doing so if there were no therapeutic alternatives, the drug was fairly safe, and if the patient suffered considerably and insisted on the drug. The study of Banjo et al. [12] showed that the safety of cognitive enhancers was also a main concern for physicians in Canada and the USA. In our study, 28% answered – in accordance with the professional guidelines – that they do not prescribe drugs without an indication. A small, but significant minority (5%) espoused a clearly liberal point of view, prescribing drugs at the request of informed patients.

Yet participants are somewhat ambivalent in dealing with the issue of NE. When asked if they would personally sub-

scribe to a categorical refusal of NE, 41% were undecided (table 6). This ambivalence already becomes apparent in the beginning of the questionnaire, when participants were asked about their spontaneous reactions to performance-enhancing drugs. There is a rather constant approval rate of more than 50% to very different statements, such as "neuroenhancement has always been around", or "this is as wrong as doping in sports", or "everyone is responsible for his/her own actions" (table 1).

There is also some uncertainty and disagreement as to how the medical profession should position itself with a view to NE. Most participants would consider NE as a matter of a physician's individual conscience. Nearly two thirds also agree that the public perception of physicians might suffer if medicine's core business moves away from treating sick people. However, opinions are divided on the issue of whether NE should be considered a reality and as such become part of medical practice for the benefit of those who wish to use them. Answers show a distribution over the whole spectrum from "completely wrong" to "completely right" with nearly one fourth (23.4%) of participants "undecided" (table 8).

The ambivalence and uncertainty is in line with other surveys. The main concern of the survey in the US [4] and the study carried out in the US and in Canada [12] was about possible side effects and a majority of the participants in the study of Banjo et al. shared a rather "conservative" view on enhancement, expressing scepticism about the use of modern technologies to produce above normal human capabilities, and being worried about their proper role as physicians. The study of Hotze et al. [4] also showed a similar constellation to the one in our study, with participants espousing a rather pragmatic approach to enhancement measures, accompanied by concerns about undesirable side effects. However, most of the physicians in the US study think that safe and efficient NEPs should be available, although they should not be reimbursed by insurance companies [4]. The survey done in Sweden revealed that participants had more negative attitude toward the use of neuroenhancers (117 physicians and 520 randomly selected individuals) [11].

### Understanding of disease criteria and justification for neuroenhancement measures

The openness of many participants to consider prescribing in the absence of a medical indication fits with their appreciation of subjective suffering and malfunctioning in daily life as criteria for disease (table 2). The two medical sub-disciplines of general medicine and psychiatry, which were included in this study, have a reputation for taking the patient's subjective perception into account and not reducing medical diagnosis to mere objective criteria. Although the acknowledgement of subjective parameters has long been called for, an emphasis on individual well-being might, on the other hand, lead to a kind of wish-fulfilling medicine that blurs the line between medical need and individual desire. From a subjectivist understanding of disease, enhancement interventions are not necessarily seen as "non-therapeutic interventions". If subjective suffering counts as a criterion for disease, enhancement interventions can be considered as a kind of therapy. This also explains why



many participants do not simply follow medical indications, which are mostly defined according to “objective” disease criteria, but consider the prescription of a drug outside of a clear medical indication as a context-dependent decision.

When asked which criteria influenced their decision to prescribe or not in cases such as the four case scenarios, most respondents chose subjective suffering (table 7). The temporariness of the measure and avoiding the development of something worse were also considered important criteria. In contrast, a majority of the participants disapproved of criteria which involved a moral evaluation of the patients’ intentions and goals by “When the person concerned did not provoke the situation she or he is in”, “Whether the goal is obviously important and valuable or also benefits others”, or “When ... the person concerned tried hard enough ...”. One can conclude from these data that the avoidance of harm (subjective suffering, worse consequences) is seen as a legitimate aim of enhancement measures, but that this is seen largely independently from a moral evaluation of the person concerned.

### The importance of the medical indication in Switzerland

Like in many other countries, it is the standard case of pharmacological treatment in Switzerland that physicians should prescribe drugs according to the related indication. Nevertheless, in some instances it is also expected or even obligatory to prescribe drugs off-label. However, this is not the case regarding the prescriptions which were described in the present study, because the questionnaire clearly referred to healthy individuals who wanted to improve their cognitive performance or wanted to manage non-health related problems. An exception may be the scenario with the shy woman. Her state might possibly also be described as a mild personality disorder or phobia. In general, drugs prescribed for the case scenarios described in our study should not have been reimbursed by Swiss health insurance [18]. The Swiss Social Insurance Law (ATSG) defines in Art. 3 disease as “every impairment of physical or mental health, which is not the consequence of an accident, requires medical examination or treatment or is followed by inability to work” [19]. The medicine compendium of Switzerland names as indications for Ritalin<sup>®</sup> (methylphenidate) hyperkinetic behaviour dysfunctions, attention-deficit hyperactivity disorder and narcolepsy and adds that “Ritalin<sup>®</sup> is indicated as a part of a comprehensive therapy programme, which should typically comprise of psychological, educational and social treatment measures” [20]. The information for modafinil in Switzerland (Modasomil<sup>®</sup>) contains the following indications: excessive somnolence in connection with narcolepsy with and without cataplexy. It adds that “a treatment with Modasomil<sup>®</sup> should only be carried out after careful diagnostic investigation by a neurologist/pulmonologist” [21]. The conditions described in the case scenarios would not have fallen under these categories, nor would there have been an indication for anti-dementia drugs.

### Limitations of the study

Regarding self-selection bias in the group of the study respondents, there are two potential scenarios. First, physicians who are particularly critical with regard to cognitive enhancement practices may have been especially interested in participating in the survey and are thus overrepresented. Second, physicians who are very much in favour of such practices may have been especially interested in the study. As a consequence, individuals with a positive attitude to such practices might be overrepresented. However, both scenarios do not seem very likely from our point of view, given the coherence with results of previous studies: similarly to the study of Hotze et al. [4], we found a high prevalence of “mixed attitudes”, i.e. an ambivalent evaluation of cognitive enhancement practices in our study sample. Furthermore, bias due to socially desired response behavior is rather improbable not only because of the anonymity of the questionnaire but also because some responses could be considered to be the socially undesirable response from an ethical or even from a legal point of view (for example the prescription of costly drugs without a medical indication). Another source of potential bias is that our questionnaire contains assumptions about an increasing use of neuroenhancers; this is not a proven fact, although the rising figures for the use of certain drugs, such as methylphenidate (Ritalin<sup>®</sup>) suggest that they are used beyond clear medical indications [15]. Finally, another limitation of the study could be the descriptions of the four case scenarios. They could only be briefly described conveying a schematic impression of the underlying clinical problem to the participants. Apart from the case of the shy woman, the cases are clearly non-pathological.

### Conclusions

Our study shows that there is considerable openness to NE among Swiss psychiatrists and general practitioners. This is not an uncritical acceptance, however, but depends on the expected alleviation of suffering, the lack of therapeutic alternatives, the safety of the drug and the preferences of the individual. Objective criteria for disease are secondary in these considerations. It might be, however, that a proximity to recognised diseases, such as social phobia, or the familiarity with a drug fosters acceptance of a NE measure. The lack of knowledge of the terms “neuroenhancement” or “brain doping”, the heterogeneity of spontaneous responses to different moral statements on NE and the uncertainty and ambivalence present in the replies to some items indicate that physicians might profit from a more systematic ethical debate on these issues. Given the sometimes rather diverging positions and increasing prescription rates of drugs such as methylphenidate (Ritalin<sup>®</sup>) that can be used as neuroenhancers, a debate within the profession might also be clarifying and help define individual members’ views. Finally, the prescription of drugs for non-therapeutic purposes is a phenomenon that deserves further analysis and research. There is a need for an ethical and legal clarification regarding the justification of drug prescriptions, which should be addressed by the respective professional societies.

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