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ATTITUDES OF UNDERGRADUATE STUDENTS IN POLAND AND KAZAKHSTAN TOWARD CLINICAL TRIALS: A COMPARATIVE STUDY

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Abstract

Clinical trials sometimes fail due to insufficient number of study participants. It is therefore, important to understand the potential barriers to recruitment of study subjects. Consequently, this study explored the similarities and differences in attitudes of university undergraduate students in Poland and Kazakhstan toward participating clinical research. The study involved a total of 337 participants (consisting of 175 students in Poland and 162 students in Kazakhstan) who completed the survey questionnaires to indicate their attitudes, perceptions, and motivations about participating in clinical trials. The questionnaire items were classified under six domains: Knowledge and experience; Beliefs; Feelings or emotions; Motivations; Concerns; and Demographic information. Results of the study identified 9 items within the domains of "Beliefs", "Feelings", and "Motivations" with similar responses among the two sampled groups. Additionally, there were 9 items within the domains of "Beliefs", "Motivations", and "Concerns" with significant differences in attitudes and perceptions between the two sampled groups. Lack of adequate public information campaigns has led to misconceptions about the clinical trials process. Efforts should be made through public information campaigns to educate the public about the benefits of participating in clinical research. Since university undergraduate students are future opinion leaders, improving their attitudes toward clinical trials would be critical in this process.

Keywords
clinical trials, attitudes, motivations, knowledge, recruitment, cross-cultural research.

Introduction

Clinical trials are widely accepted by the medical and scientific communities as the best method for developing and evaluating new interventions for efficient and effective healthcare. It is also generally agreed that the goal of healthcare research is to develop new, safe and effective treatment options for various health maladies through rigorous testing and assessments.[1] Thus, clinical trials are paramount in developing new treatment regimes, and vaccine development, and represent a basic component of the contribution of national health systems towards eliminating the spread of preventable diseases.[2] In fact, clinical studies are required by regulatory agencies in many countries (including United States, Canada, and European Union, Japan) for new drugs to be approved and marketed to the public.

Patient recruitment has been widely recognized as a major barrier to successful completion of clinical trials.[3,4] In clinical research, one of the reasons for being a participant may be the anticipated benefits from such an engagement. Participants' decisions to volunteer for clinical research are often multi-faceted and may be impacted by their age, motivations, cultural norms and other internal and external factors.[1] However, in studies that offer no real benefit to the participant, other factors may influence someone to accept or decline participation. For example, it was found that participants in the United States were motivated by curiosity, contribution to scientific knowledge, and possible health benefits.[5] Additionally, healthy volunteers often weigh a range of concerns including risks, benefits, study goals, inconvenience, time commitment, and the possibility of contributing to scientific knowledge before making a decision on whether to participate.[5,6]

As clinical trials are increasingly expanding to developing nations, researchers must ensure cultural relevance of subject recruitment and the informed consent process.[7] Trials can fail in situations where insufficient patients are recruited, with the consequence that inadequate recruitment can threaten the reliability and validity of findings. Importantly, attitudes of patients in different countries may vary due to differences in health literacy, cultural values, trust in physicians and the healthcare system, access to care, knowledge and experience about the clinical trial process, perceived risk factors, and perceived benefits.[7, 8]
Understanding patients' attitudes toward participation in clinical research in different countries is critical to the effective and ethical design of cross-cultural collaborative studies.[9] There is substantial research suggesting an important role of cognitive and affective aspects of individuals' attitudes.[10] Attitudes are a summary evaluation of objects shown to influence individuals' information processing and behavior. Constructed on the foundation of knowledge and beliefs as well as affects, attitudes have been shown to predict future behavior.[11,12] This study is based on the theoretical framework that lack of education about clinical trials' process and benefits are barriers to participation. While it is true that some people may be discouraged to participate because of the perceived risks even with the right education and information campaigns, others may be persuaded to engage in clinical studies because of the benefits, especially when measures are put in place to minimize the risks to participants.

In this study, we undertook a survey of university undergraduate students in Poland and Kazakhstan to compare their attitudes toward clinical research. The selection of the two countries was dictated by the authors' universities locations, as well as the fact that such comparison has never been done before in the context of college students' attitudes to clinical trials. Poland has a longer history of clinical trials dating back to 1958[13] than Kazakhstan where international clinical trials began in 2009[14]. Thus, students in both countries are expected to show certain differences in their views about clinical trials. Additional, Kazakhstan has a culture of strong family/kinship ties (clanism),[15] and Kazakhs are influenced by the views and opinions of family members. This means that the views of family members can affect a Kazakhs' decision to participate in clinical studies.

Methods and Samples

The study sample is comprised of undergraduate students between the ages of 18 and 29 years old from College of Economics and Computer Science in Cracow, Poland and KIMEP University (formerly called Kazakhstan Institute of Economics and Strategic Research) in Almaty, Kazakhstan. KIMEP University is based on the United States university model, with English language as the medium of instruction. Both universities are non-profit, private institutions, with comparable undergraduate enrolment, and are located in major cities of the respective countries. Convenience sampling was used to collect data among willing participants by means of fully structured internet-based questionnaire, including items scaled at nominal and ordinal (i.e. Likert-type items) levels.

The survey instrument was constructed based on attitudinal factors that affect clinical trials' participation and adapted from previous studies.[7, 10] To ensure equivalence in measurement procedures, the questionnaires were first pre-tested among a small group of students (17 in each country), and it was found that the constructs used in the questionnaires and the issue of clinical trials are not culturally sensitive, and thus do not vary in both countries. Questions in the survey instrument were grouped under the following six domains: Knowledge and experience about clinical trials; Beliefs about clinical trials; Feelings and emotions about clinical trials; Motivations to participate in clinical trials; Concerns about participating in clinical trials; and Demographic information. Knowledge of clinical trials is also measured in this study indirectly by observing the rate of "neutral" responses in Likert-scaled items, which may be logically interpreted as no attitude, where knowledge is a component of an individual's attitude.[16] For the purpose of this article, the authors discuss only the most important findings. A sample of the survey instrument, including all items, is shown in Appendix A. The survey was conducted between October and December 2018. Basic characteristics of the sample groups are shown in Table 1.

Table 1: Sample characteristics

Sample	Kazakhstan	Poland
Size n=337	n=162	n=175
Gender	males=35%; females=65%	males=68%; females=32%
Mode of study	full-time=97%	full-time= 42%; part-time=52%
Employment	employed=36%	employed=66%
Marital status	single=88%	single=60%
Children	no=85%	no=99%
Place of residence	large or medium-size city=92%	large or medium-size city=66%; village or small town=34%
Religiosity	yes or somewhat=71%	yes or somewhat=64%
Prior knowledge of clinical trials	no=85%	no=75%

Source: Field data; statistics calculated using GNU PSPP (ver. 1.2.0-g0fb4db).

Data Analysis

The statistical analysis was performed using GNU PSPP, a free statistical analysis package (ver. 1.2.0-g0fb4db). Before the analysis, the data was cleaned and checked for inconsistencies. The authors employed frequency analysis to examine the attitude structure in both samples. To compare sample means and identify differences between both samples of students independent sample t-test was used following the common practice among researchers supported by empirical findings that confirm the robustness of parametric tests for ordinal scales.[17 -19] Items which were found statistically insignificant in the t-test are presented in an aggregated form , that is, frequencies are offered for the total sample of both Polish and Kazakh students with separate descriptive statistics for each subsample. The items which were found to significantly differentiate subsamples are shown with respective items' frequencies for both subsamples as well as descriptive statistics and p scores.

Research Findings

There was a total of 337 study participants (n=337) consisting of 175 students in Poland (n=175) and 162 students in Kazakhstan (n=162). The Polish sample comprised of 68% males and 32% females. Forty-two percent of the Polish sample were traditional, full-time students, while 52% were part-time, weekend students. In addition, 66% of the Polish had part-time jobs, 60% were single, and 99% were not parents or legal guardians. Similarly, 66% of the Polish students lived in large or medium-sized cities, while 34% lived in villages or small towns as shown in Table 1. The Kazakh sample was composed of 65% female and 35% male students. Ninety-seven percent of the Kazakh sample were enrolled in a traditional undergraduate program while 36% had part-time jobs. Most of the students (88%) were single, 15% were parents or legal guardians, and 92% lived

in large of medium-sized cities. Majority of students in both samples had no prior knowledge of clinical trials (75% of Polish students and 85% of Kazakh students). Among Polish students, 64% perceived themselves as either religious people or somewhat religious, while 71% of Kazakh students identified themselves as either religious or somewhat religious. Additionally, none of the students in this research was studying healthcare because healthcare-related courses were not offered in both the Polish and Kazakh universities.

Table 2 depicts items which are found not to have statistically significant differences in responses from both student groups by means of the independent sample t-test, while Table 3 shows the items with statistically significant differences in levels of responses between both subsamples. The amounts of variation (standard deviation) around means are similar between groups and relatively small. Analysis of the data identified some similarities and differences in attitudes and perceptions of both student groups.

Similarities between Polish and Kazakh Students' Responses

Analysis of survey responses shows that the student groups in Poland and Kazakhstan exhibit similar general positive attitudes toward clinical trials in 9 key areas based on the following survey questions:

1. *Clinical trials are needed to improve healthcare standards:* Improved health standards in disease prevention and control, better treatment methods, etc. can only be achieved through human clinical research.[9] Results of the study indicate that 67% of respondents from both student groups "*agree/strongly agree"* that clinical studies are necessary for improved healthcare standards. This finding conforms to various attitudinal studies on clinical research.[6,10] Without clinical trials that utilize human subjects, it would be practically impossible to address the plethora of health issues that confront the global community.[11]

2. *Clinical trials are costly for patients to participate:* Participation in clinical trials imposes costs on the subjects in terms of time, inconvenience, etc. Consequently, 18% of both the Polish and Kazakh student groups "*agree/strongly agree"* that participants in clinical trials are burdened with some costs during the process, and that this may discourage participation. The perception of costs borne by clinical research subjects has been found to be a major determinant of the willingness to participate. [8,12,7] More efforts should be undertaken by clinical research planners to mitigate the perceptions of costs imposed on participants.

3. *Clinical trials are run by pharmaceutical companies only to make money:* Several studies[11,7] indicate that some respondents believe that the main beneficiaries of clinical trials are mainly researchers and pharmaceutical firms. This view is shared by 15 % both the Polish and Kazakh student groups who "*agree/strongly agree"* that pharmaceutical firms engage in clinical trials solely for financial gains.

4. *Clinical trials should be voluntary:* Trial participants should not be coerced through misinformation or other methods. Survey results indicate that 67% both student groups "*agree/strongly agree"* that participation in clinical research should be through free choice once all accurate and relevant information are provided to participants. Sustained public

information campaigns about the value of clinical trials should be provided to the public to encourage their voluntary engagement in the clinical research process.[9]

5. *People should be paid to participate in clinical trials:* According to survey results, 55% of the respondents "*agree/strongly agree"* that participants in clinical trials should be given financial rewards. This finding confirms previous studies indicating financial rewards as motivations for participation in clinical trials.[5,10]

6. *People who participating in clinical trials should keep it a secret because of the stigma attached to it (e.g. being used as a guinea pig):* There is a perception that participants in clinical studies are used as "guinea pigs" for experimental purposes in the quest for new treatment methods.[13] Results of our survey show that 39% of both the Polish and Kazakh student samples "*agree/strongly agree"* that they would keep their participation in clinical trials a secret because of this perception.

7. *I am more likely to participate in clinical trials if my genetic information is not collected:* Some potential research participants are afraid of being diagnosed with potentially severe medical conditions if their genetic information is collected during the research process.[14] Such participants do not want to be burdened with the thought that they would have to deal with serious medical issues later in life. This view conforms to our survey results. Respondents (28%) "*agree/strongly agree"* that collection of genetic information would adversely affect their participation intentions.

8. *I am more likely to participate in clinical trials if advised to do so by family and friends:* In close-knit families and collectivist societies, the influence of families and friends on the decision to participate in clinical trials can quite be significant. Survey results indicate that 38% of both sample "*agree/strongly agree"* that the opinions of family and would affect their decisions to participate in clinical research.

9. *I am more likely to participate in clinical trials if doing so will help other patients:* The role of altruism as a motivation to participate in clinical trials has been stated in various studies.[1,13] Participants are more willing to be involved in clinical trials if doing so will help improve the medical condition of a loved one or a friend. According to our survey results, 50% of respondents "*agree/strongly agree"* that they participate in clinical research in order to help others.

Table 2: Items with Similar Responses from Polish and Kazakh Samples

No.	Questionnaire items	Frequencies for total sample			Mean (Standard Deviation)	
		Disagree/Strongly Disagree (%)	Neutral (%)	Agree/Strongly Agree (%)	KZ subsample	PL subsample
1	Clinical trials are done in order to improve healthcare standards	20	13	67	3.57 (1.09)	3.75 (1.06)
2	Clinical trials are costly for patients to participate.	31	51	18	2.75 (0.92)	2.83 (0.96)
3	Clinical trials are run by pharmaceutical companies only to make money.	38	47	15	2.65 (0.94)	2.78 (0.93)
4	Clinical trials should be voluntary.	18	15	67	3.84 (1.24)	4.03 (1.29)
5	People should be paid for participation in clinical trials.	34	11	55	3.58 (1.20)	3.60 (1.12)
6	People who participate in clinical trials should keep it a secret because of the stigma attached to it (e.g. being used as a guinea pig)	44	37	39	2.73 (0.97)	2.72 (0.94)
7	I am more likely to participate in clinical trials if my genetic information is not collected.	24	48	28	2.84 (1.0)	3.01 (0.95)
8	I am more likely to participate in clinical trials if advised to do so by family and friends.	22	20	38	3.02 (1.02)	3.20 (1.08)
9	I am more likely to participate in clinical trials if doing so will help other patients.	40	10	50	3.33 (0.98)	3.55 (1.06)

Source: Field data; statistics calculated using GNU PSPP (ver. 1.2.0-g0fb4db).
Note: KZ depicts Kazakh sample, while PL depicts Poland sample

Differences between Polish and Kazakh Students' Responses

Independent sample T-test has shown statistically significant differences in attitudes of the Polish and Kazakh student samples in 9 questionnaire items. As mentioned earlier, the amount of variation (standard deviation) around means are similar between groups and relatively small. This sub-Section discusses the differences in responses in the *"agree/strongly agree"* categories in the 9 questionnaire items.

1. *Children should be able to participate in clinical trials:* Children have distinct developmental and psychological differences from adults.[15] It is therefore, important to develop age-specific, empirically verified therapies and interventions in order to provide the best medical treatment available.[18-21] Children as research subjects have special needs because of their vulnerabilities and developmental challenges.[20-23] Consequently, the idea of involving children in clinical research poses a big dilemma. On the one hand, the long-term implications of such research on the children may not be easily foreseen by the parents. On the other hand, without clinical trials in children, improved treatment options for them would be difficult to develop. While both Polish and Kazakh students indicate uneasiness about using children in clinical research, Kazakh students are less likely to support this idea. Results of the survey shows that 10% of the Kazakh sample "*agree/strongly agree"* that children should participate in clinical research, while 30% of the Polish sample "*agree/strongly agree"* with this view.

2. *Patients are misinformed about risks of participating in clinical trials:* A major barrier to recruiting subjects for clinical trials is the lack of trust in the information provided about the potential risks of participation. Various studies[13,7,9] identify the need for full disclosure about potential risks to participants. In this survey, 9% of Polish respondents *"agree/strongly agree"* that patients are misinformed about risks of participating in clinical trials. A significantly greater number (30%) of the Kazakh sample *"agree/strongly agree"* on this issue.

3. *You need to have the right connections to participate in clinical trials:* Since many people are unaware that information about participation in clinical trials can be obtained online.[4] it is believed that only those with right connections are recruited to participate in clinical studies. This is especially true in societies where appointments to important positions are usually not based on merit due to a culture of favoritism and clanism.[21] According to survey results, 10% of Polish sample *"agree/strongly agree"* that the right connection is needed to participate in clinical research, while this view is endorsed by 26% of the Kazakh sample.

4. *I am less likely to participate in clinical trials if my medical records and financial status will be made public:* The issue of confidentiality of personal information is one of the major tenets of best practices in clinical studies. Several studies[7,24,12] emphasize the significance of privacy and confidentiality of information in the clinical trials process. In our study, results indicate that 49% of the Polish sample *"agree/strongly agree"* that lack of confidentiality of personal medical information would constitute a barrier to participating in clinical research, while 39% of the Kazakh sample share the same view.

5. *I am more likely to participate in clinical trials if advised to do so by my doctor:* Physicians are important source of medical information to patients, and thus can affect the decision to participate in clinical trials.[7,25] The doctor-patient relationship can have a decisive impact on a patient's decision to participate in clinical research. A doctor's influence on a patient's decision can be enhanced by the level of trust between both parties. Results of the survey indicate that 40% of the Polish sample *"agree/strongly agree"* that

they would participate in clinical trials if advised to do so by their doctor, while 36% of the Kazakh sample share the same opinion.

6. *I am more likely to participate in clinical trials for free medical care:*
The provision of free medical care can be a motivation to participate in clinical studies. This is especially true for people in low-income communities where such participation may be the only means to receive quality healthcare. Our Polish sample (53%) *"agree/strongly agree"* that free medical care can positively affect their decision to engage in clinical studies, while 36% of the Kazakh sample would do the same. This finding is in line with previous studies[7,12] on the impact of free healthcare on participation intention.

7. *My greatest concern about participating in clinical trials is potential risks to my health and life:* The possibility that something may go wrong in the clinical trials process to the detriment of the health and life of participants can be a barrier to the recruitment of subjects.[6] Results of the survey show that 30% of the Polish sample *"agree/strongly agree"* that the potential risks to life and health of participants is a great concern that could discourage participation. A significantly higher number, 57% of the Kazakh sample *"agree/strongly agree"* that risks to life and health can be a major barrier to participation in clinical studies.

8. *My greatest concern about clinical trials is that I may not be able to withdraw if I change my mind in the middle of the trial:* It is widely believed that once a clinical trial is initiated, it may be difficult for participants to withdraw from the study if they change their minds.[9,4] This belief is reinforced by the fact that even when a participant is allowed to withdraw in the middle of a clinical study, potential health implications may arise because the subject will be no longer be under observation by the clinical research team. Survey results show that 47% of the Polish sample *"agree/strongly agree"* that inability to withdraw in the middle of clinical trials is a barrier to participation intention, while 31% of the Kazakh sample share the same opinion. This finding confirms the results of other studies.[7,4,11]

9. *I am more likely to participate in clinical trials if it will make me live longer:*
The belief that clinical trials will prolong the life of a patient as a motivation for participation has been indicated by various studies.[11] This can be especially true for patients with life-threatening health conditions hope of a cure due to lack of available curative options. According to survey results, 69% of the Polish sample *"agree/strongly agree"* that they would participate in clinical studies if doing so would prolong their lives. On the other hand, a smaller number (53%) of the Kazakh sample would do the same.

Table 3. Items with Different Rates of Responses from Polish and Kazakh Samples

No.	Questionnaire Item	PL sample			KZ sample			Mean (Standard Deviation)	T-test sig. *
		Disagree/ Strongly disagree (%)	Neutral (%)	Agree/ Strongly agree (%)	Disagree/ Strongly disagree (%)	Neutral (%)	Agree/ Strongly agree (%)		
1	Children should be able to participate in clinical trials.	58	12	30	55	25	10	KZ: 2.27 (1.03) PL: 2.95 (1.14)	.001
2	Patients are misinformed about risks of participating in clinical trials.	73	18	9	37	33	30	KZ: 3.02 (1.05) PL: 2.74 (0.76)	.006
3	You need to have the right connections to participate in clinical trials.	53	37	10	58	16	26	KZ: 3.01 (1.02) PL: 2.77 (0.84)	.022
4	I am less likely to participate in clinical trials if my medical records and financial status will be made public.	35	16	49	40	21	39	KZ: 2.86 (1.12) PL: 2.53 (1.17)	.000
5	I am more likely to participate in clinical trials if advised to do so by my doctor.	32	28	40	39	35	36	KZ: 2.84 (1.05) PL: 3.28 (1.00)	.000
6	I am more likely to participate in clinical trials for free medical care.	22	25	53	52	12	36	KZ: 3.06 (1.12) PL: 3.58 (1.03)	.000
7	My greatest concern about participating in clinical trials is potential risk to my health and life	48	22	30	24	19	57	KZ: 2.57 (1.24) PL: 3.69 (1.05)	.000
8	My greatest concern about clinical trials is that I may not be able to withdraw if I change my mind in the middle of the trial.	26	33	47	37	32	31	KZ: 2.70 (1.17) PL: 3.54 (1.04)	.000
9	I am more likely to participate in clinical trials if it will make me live longer.	20	21	69	19	28	53	KZ: 3.38 (1.13) PL: 3.89 (1.13)	.000

Source: Field data; statistics calculated using GNU PSPP (ver. 1.2.0-g0fb4db).

* Independent samples T-test p-value, all differences are significant at least $p<0.05$; equality of variance are not assumed.

Note: KZ depicts Kazakh sample, while PL depicts Poland sample

Recommendations and implications

Recruitment and retention are vital parts of the clinical research process. This study is the first of its kind that focuses on clinical trial participation intention among undergraduate students in Poland and Kazakhstan. Responses of students from both countries were comparable to many questionnaire items, but there were also some striking differences. Overall, the responses of students from both countries had the strongest similarities in terms of the need for clinical trials to improve healthcare standards (67%), voluntariness of participation (67%), the fact that participants should be paid to participate in clinical studies (55%), and willingness to participate in clinical studies if it would help others (altruism) (50%).

In terms of differences, inability to withdraw in the middle of a trial was the biggest concern for Polish students (47%) compared to Kazakh students (31%). On the other hand, safety was the greatest concern for Kazakh students (57%), compared to Polish students (30%). This could be because 85% of the Kazakh students had no prior knowledge of clinical trials compared to 75% of the Polish students, and were thus more ambivalent about the process. Whether clinical trials participation would lead to self-benefits in terms of free medical care was surprisingly a greater concern for Polish students than Kazakh students (53% versus 36%). This could be due to the fact that healthcare costs for Kazakh citizens are highly subsidized by the government and therefore not a highly motivating factor.

Drawing on these findings, clinical research teams should be able to create some universal themes in their recruitment strategies to strengthen positive attitudes toward clinical trials in order to increase rates of participation.[11] It seems important to stress that in many countries clinical trials are by law voluntary and generally patients cannot be directly compensated for participating.[26] However, it is common to reimburse patients' participation costs (e.g. travel), and ensure that all trial-related medical procedures are covered by the trial sponsors, including all adverse effect-related interventions.

Clinical research teams need to consider population differences in their efforts to conduct trials in cross-cultural contexts. Recruitment strategies might need to efficiently overcome greater unwillingness to allow children participate in clinical trials among Kazakh students, as well as their seeming distrust of information about participation risks and opportunities (i.e. you need no connections). On the other hand, Polish students would require greater encouragement from their doctors, assurances that their personal information is safe from the public, and that they can withdraw anytime. Moreover, free medical care, chances of longer life and reasonably limited side effects would be motivating factors for them. Most of the aforementioned attitude issues differentiating Polish and Kazakh students have been addressed by various studies, [10,1,5,6] as determinants of participation intention.

Clinical trials organizers should ensure that effective information campaigns about the benefits of participation are enhanced and targeted toward all segments of society. Since perceptions and beliefs have been identified as barriers to participating in clinical research[7,24-27], appropriate

measures should be taken to ensure to mitigate the major barriers to participation (such as fear for one's health and life, perceived financial risk, personal inconvenience, etc.). Similarly, factors that enhance motivation intention include (e.g. altruism, new treatment methods, etc.) should be accentuated to potential participants in the recruitment process.

There are suggestions that efforts to establish greater links between researchers and participants, such as creating an atmosphere of openness to dialogue, and opportunities for asking questions about various aspects of the trials process should be encouraged.[13, 29,30] This is essential in ensuring that the general public is well-informed about the clinical trials' process. As part of public information campaign strategy, websites could be developed in both countries that focus on promotion of clinical trials information.

Limitations and Suggestions for Future Research

This study has a number of limitations. First, this is a limited study that focused only on the attitudes of university undergraduate student groups in Poland and Kazakhstan toward clinical trials. As the study is limited only to students of one university in each of the two countries, the findings may not accurately reflect the views of the entire student populations in both countries. Second, while this study provides insights into the views of a relatively young student population, a more generalized study of the attitudes of the general population in both countries toward clinical studies is warranted. Third, as the first of its kind in both countries, this study will serve as a basis for further research on how to the level of clinical trials' literacy among the general population in Poland and Kazakhstan. Fourth, none of the students in this research was studying in the healthcare field, and this might have affected their responses. Fifth, it is important to remember that the convenience sampling used by the researchers limit the generalizability of the finding, which should be treated as exploratory. Further research should examine the barriers that may exist for individuals, who once are motivated to participate, may still be reluctant to be involved in the clinical trials' process.

Conclusion

This study provides insights into attitudes of university undergraduate students in Poland and Kazakhstan toward clinical trials. With advances in understanding of diseases and the search for new treatment and preventive methods, more opportunities for clinical trials will require increasing the number of study participants. Low recruitment of study subjects has the implications of slow trials' completion or cancellation of trials due to inadequate participants. The drive towards more cross-national trials and large-scale studies may be boosted if issues of cultural biases are adequately addressed by trials' organizers. This study provides insights into the factors that affect attitudes of Polish and Kazakh students, which would be useful toward the design of cross-cultural trials in both countries. Studies aimed at understanding the attitudes and perception of the general population toward clinical trials (especially in cross-cultural contexts) are essential for future efforts in the design and planning of clinical research. In this regard, this study is an essential step in understanding the barriers and motivations for participation in clinical trials in cross-national investigations.

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Appendix A

Students' Attitudes to Clinical Trials Questionnaire

Thank for considering participating in this study. The survey is completely anonymous and is conducted solely for scientific purposes. Please keep in mind that there are no right or wrong answers in this survey. We strongly encourage you to share your real thoughts and feelings.

A. Knowledge and Experience about Clinical Trials

To start, please answer the following questions about your general knowledge and experience with clinical trials. Select only one response.

1	Have you ever participated in clinical trials?	□ *yes*		□ *no*	
2	Have any of your family members ever participated in clinical trials?	□ *yes*	□ *no*	□ *not sure*	
3	Have any of your acquaintances ever participated in clinical trials?	□ *yes*	□ *no*	□ *not sure*	
4	How would you rate your current knowledge about clinical trials?	□ *excellent*	□ *some*	□ *little*	□ *none*

B. Beliefs about Clinical Trials

People may have different beliefs about clinical trials. Please consider your beliefs and select only one of the following responses: *1= strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree*.

		1	2	3	4	5
5	Children should be able to participate in clinical trials.	□	□	□	□	□
6	Clinical trials are costly for patients to participate.	□	□	□	□	□
7	Clinical trials are dangerous experiments on humans.	□	□	□	□	□
8	Clinical trials are done in order to improve healthcare standards.	□	□	□	□	□
9	Clinical trials are required for a new drug to be approved for sale.	□	□	□	□	□
10	Clinical trials are run by pharmaceutical companies only to make money.	□	□	□	□	□
11	Clinical trials should be voluntary.	□	□	□	□	□
12	Clinical trials will lead to better treatments of diseases.	□	□	□	□	□
13	Doctors talk their patients into participating into clinical trials only for financial gain.	□	□	□	□	□
14	If there are problems with the tested drugs in clinical trials, patients are not sufficiently taken care of.	□	□	□	□	□
15	It takes a lot of effort to participate in clinical trials.	□	□	□	□	□
16	It takes a lot of time to participate in clinical trials.	□	□	□	□	□
17	Participants in clinical trials should be able to withdraw in the middle of the trials.	□	□	□	□	□
18	Patients are misinformed about risks of participating in clinical trials.	□	□	□	□	□
19	People should be paid for participation in clinical trials.	□	□	□	□	□
20	People who participate in clinical trials receive better medical care.	□	□	□	□	□
21	Trial participants should sign an informed consent form only after receiving verbal and written information about all aspects of the trial.	□	□	□	□	□
22	You need to have the right connections to participate in clinical trials.	□	□	□	□	□

C. Feelings or Emotions about Clinical Trials

Thinking or hearing about clinical trials may cause with people different feelings or emotions. Please consider your feelings and select only one of the following responses: *1= strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.*

		1	2	3	4	5
23	Clinical trials bring to mind feelings of hope.	□	□	□	□	□
24	Clinical trials feel like the last resort, when there is no other option left.	□	□	□	□	□
25	I am afraid to participate in clinical trials.	□	□	□	□	□
26	I do not trust clinical trials to be safe for patients.	□	□	□	□	□
27	My doctor will be pleased when I participate in clinical trials.	□	□	□	□	□
28	Participating in clinical trials feels like the right thing to do.	□	□	□	□	□
29	People who participate in clinical trials should keep it a secret because of the stigma attached to it (e.g. being used as a guinea pig).	□	□	□	□	□
30	Participating in clinical trials would make me proud.	□	□	□	□	□

D. Motivations to Participate in Clinical Trials

Were you to face a dilemma to participate in a clinical trial, what would make you more or less likely to do so? Consider the following conditions and select one of the following responses: *1= strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.*

		1	2	3	4	5
31	I am less likely to participate in clinical trials if *my medical records and financial status will be made public.*	□	□	□	□	□
32	I am less likely to participate in clinical trials if *my health condition will be made public.*	□	□	□	□	□
33	I am more likely to participate in clinical trials *if given money.*	□	□	□	□	□
34	I am more likely to participate in clinical trials if *my genetic information is not collected.*	□	□	□	□	□
35	I am more likely to participate in clinical trials *if advised to do so by my doctor.*	□	□	□	□	□
36	I am more likely to participate in clinical trials *if advised to do so by family and friends.*	□	□	□	□	□
37	I am more likely to participate in clinical trials for *free medical care.*	□	□	□	□	□
38	I am more likely to participate in clinical trials *if it will make me live longer.*	□	□	□	□	□
39	I am more likely to participate in clinical trials *if doing so will improve my medical condition.*	□	□	□	□	□
40	I am more likely to participate in clinical trials *if doing so will help other patients.*	□	□	□	□	□
41	I am more likely to participate in clinical trials *if I am not satisfied with my current treatment.*	□	□	□	□	□

E. Concerns about Participating in Clinical Trials

Do you agree or disagree that the following might be reasons for concern if considering participation in clinical trials. select one of the following responses: *1= strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.*

		1	2	3	4	5
42	My greatest concern about participating in clinical trials is *potential risks to my health and life.*	□	□	□	□	□
43	My greatest concern about participating in clinical trials is *personal financial costs if something goes wrong.*	□	□	□	□	□
44	My greatest concern about participating in clinical trials is *possible side effects from the trials.*	□	□	□	□	□
45	My greatest concern about participating in clinical trials is *privacy of my information.*	□	□	□	□	□
46	My greatest concern about participating in clinical trials is that *I may not be able to withdraw if I change my mind in the middle of the trial.*	□	□	□	□	□

F. Demographic Information

To finish, please answer a few more questions for statistical reasons.

47	You are	□ *male*	□ *female*		
48	You belong to the age group	□ *18-29*	□ *30-44*	□ *45-59*	□ *More than 60*
49	You are currently	□ *freshman or sophomore*	□ *junior or senior*		
50	Your studies are	□ *traditional full-time*	□ *part-time evening or weekend*	□ *distance / online*	
51	Do you currently have a job?	□ *permanent, full-time*	□ *part-time or temporary*	□ *I don't have a job*	
52	You live in	□ *village or town up to 19,000*	□ *city between 20,000 – 99,000*	□ *city between 100,000 – 300,000*	□ *city over 300,000*
53	You are	□ *single*	□ *married*	□ *divorced or separated*	□ *other*
54	Are you a parent or a legal guardian?	□ *yes*	□ *no*		
55	Do you consider yourself a religious person?	□ *yes*	□ *somewhat*	□ *no*	

Thank you for taking part in this survey.