| **Title** | Understanding and Attitudes toward Cancer Clinical Trials among Patients with a Cancer Diagnosis: National Study through Cancer Trials Ireland |
|-----------|-----------------------------------------------------------------------------------------------------------------|
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| **Publication date** | 2020-07-16 |
| **Publication information** | Cancers, 12 (7): , Article Number: 1921 |
| **Publisher** | MDPI |
| **Item record/more information** | http://hdl.handle.net/10197/12068 |
| **Publisher's statement** | This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited |
| **Publisher's version (DOI)** | 10.3390/cancers12071921 |
Abstract: Cancer clinical trials (CCTs) are critical to translation and development of better therapies to improve outcomes. CCTs require adequate patient involvement but accrual rates are low globally. Several known barriers impede participation and knowing how subpopulations differ in understanding of CCTs can foster targeted approaches to aid accrual and advance cancer treatments. We conducted the first nationwide survey of 1089 patients attending 14 Irish cancer centres, assessing understanding of fundamental concepts in CCT methodology and factors that influence participation, to help tailor patient support for accrual to CCTs. Two-thirds (66%) of patients reported never having been offered a CCT and only 5% of those not offered asked to participate. Misunderstanding of clinical equipoise was prevalent. There were differences in understanding of randomisation of treatment by age \( (p < 0.0001) \), ethnicity \( (p = 0.035) \) and marital status \( (p = 0.013) \), and 58% of patients and 61% previous CCT participants thought that their doctor would ensure better treatment in CCTs. Females were slightly more risk averse. Males indicated a greater willingness to participate in novel drug trials \( (p = 0.001, p = 0.003) \). The study identified disparities in several
demographics; older, widowed, living in provincial small towns and fewer years-educated patients had generally poorer understanding of CCTs, highlighting requirements for targeted support in these groups.

**Keywords:** cancer; clinical trials; patient perception; understanding

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1. Introduction

Cancer Trials Ireland is the largest collaborative cancer research infrastructure in Ireland. Through its network of cancer centres, we conducted the first nationwide study exploring attitudes and understanding of cancer clinical trials (CCTs) among adult oncology patients in Ireland. We also sought to determine factors and supports patients considered important when making decisions about participation. Clinical trials are critical to the translation and development of better oncology therapies. Accrual rates to oncology trials are low globally, with an estimated 1 in 10 clinical trials stopped as a result [1]. In Ireland, a key performance indicator of the National Cancer Strategy 2017–2026 is to increase the percentage of patients on cancer therapeutic clinical trials from 3% to 6% by 2020 [2]. Professional organisations and patient advocacy groups encourage patients with cancer to consider CCTs as a routine component of oncology care [3–5].

To achieve an increase in CCT accrual, it is recognised that practical barriers at the site/organisation, physician/provider and patient/community levels must be addressed [6–8]. Physicians and providers often have insufficient protocols or those they have exclude significant populations of patients such as the elderly or those with co morbid illnesses. Patients express a willingness to participate in CCTs, yet only small percentages enrol [9]. Cancer trials cannot be conducted unless patients are willing and able to participate. Sociodemographic disparities have shown lower rates of participation in older populations, prompting an announcement by the American National Institute of Health in 2018 for researchers to include participants across the lifespan [10–14].

The Irish Platform for Patients’ Organisations, Services and Industry (IPPOSI) study to ascertain Irish public awareness and understanding of clinical research highlighted poor understanding of the terms “clinical research” and “clinical trial” and that the public while supportive of CCTs were uncomfortable with participating in them [15]. A follow-up study showed greater willingness to participate in non-therapeutic cancer clinical research but less so for therapeutic clinical trials.

We previously conducted a study that identified lack of a CCT option as the main reason for failure to recruit in Ireland [16]. Collectively, these studies showed the need for this current study to identify how patients understood CCTs and what barriers they perceive to participation. Identification of these barriers and efforts to remove them represent critical objectives for cancer investigators, patients, and stakeholders across the research spectrum. Accrual to clinical trials influences the timely availability of new therapies and impacts on patient outcomes. It is important to recognize factors that can influence accrual to clinical trials to offer the opportunity to modify such factors where possible and tailor information to increase accrual in line with Ireland’s National Cancer Strategy.

2. Method

This is a descriptive study of patients attending 14 Irish cancer centres from April to November 2016, aged ≥18 years with a clinical diagnosis of malignancy, able to complete a standardised questionnaire independently or with the help of a friend, relative, or oncology staff member. Questionnaire completion implied informed consent. The study received full ethical approval at all participating sites.

The questionnaire was divided into the following sections: (A) demographic details; (B) objective measure of wellbeing using the EORTC EQ-5D-5L instrument; (C) cancer diagnosis and treatment details; (D and E) statements about clinical research and CCTs, rated on Likert scales a; (F) questions
relating to CCT participation and decision making; (G) questions specifically targeted at those patients who had previously participated in a CCT.

**Statistical Analysis**

Descriptive statistics are presented as means, medians, interquartile ranges and percentages. Categorical data associations were assessed using Pearson’s $X^2$ or Fisher’s exact (when numbers in cells were <5) statistical tests. Variables were tested against patient demographic characteristics (Table 1) and offer of participation to a clinical trial, to explore for differences that may influence decisions regarding participation in CCTs. No adjustments to significance levels were made. Only significant results at p-value $\leq 5\%$ are presented. Other tests of associations were conducted but not presented in the results, as numbers were too small or they did not achieve statistical significance at p-value $\leq 5\%$. We performed a binomial regression to look at the effects of confounders. Due to small numbers, dimensions of wellbeing were collapsed into patients that had no problems and those that had any problem (i.e., slight + moderate + severe + unable were combined). EORTC EQ-5D-5L results are expressed as medians. Missing data are included in relevant tables but were excluded from the analysis. Denominators varied as some questions were only applicable for certain group(s) of patients. Data were analysed using STATA version 15.0 (StataCorp, College Station Texas).

### Table 1. Demographic Details.

|                         | Number (n) | Percentage (%) |
|-------------------------|------------|----------------|
| **Age (Years)**         |            |                |
| Missing = 18            |            | 2              |
| Mean age 59 (min 18, max 89) | 594        | 55             |
| Median age 60 (IQR 50–69, n = 1071) | 60         | 55             |
| Median age female 57 (IQR 48–66, n = 690) | 57         | 55             |
| Median age male 65 (IQR 56–71, n = 381) | 65         | 55             |
| $\leq$40               | 99         | 9              |
| 41–50                  | 179        | 16             |
| 51–60                  | 275        | 25             |
| 61–70                  | 308        | 28             |
| $>71$                  | 210        | 19             |
| $\leq$65               | 708        | 65             |
| $>65$                  | 363        | 33             |
| **Gender**             |            |                |
| Missing = 7            |            | 1              |
| Male                   | 386        | 35             |
| Female                 | 696        | 64             |
| **Ethnicity**          |            |                |
| Missing = 8            |            | 1              |
| Irish                  | 1019       | 94             |
| Irish Traveller        | 2          | <1             |
| Other European         | 47         | 4              |
| Asian                  | 9          | 1              |
| African                | 1          | <1             |
| Other                  | 3          | <1             |
| **Marital Status**     |            |                |
| Missing = 7            |            | 1              |
| Married/living with partner | 778  | 71              |
Table 1. Cont.

|                          | \( n = 1089 \) | Number (\( n \)) | Percentage (%) |
|--------------------------|---------------|------------------|----------------|
| Divorced                 |               | 27               | 2              |
| Single                   |               | 129              | 12             |
| Widowed                  |               | 97               | 9              |
| Separated                |               | 51               | 5              |
| **Number in household**  |               | **Missing = 24** |                |
| Respondent only          |               | 170              | 16             |
| +1                       |               | 382              | 35             |
| +2                       |               | 210              | 19             |
| +3                       |               | 157              | 14             |
| +4                       |               | 89               | 8              |
| +5                       |               | 39               | 4              |
| +6                       |               | 13               | 1              |
| +7                       |               | 2                | <1             |
| +8                       |               | 1                | <1             |
| +9                       |               | 1                | <1             |
| +13                      |               | 1                | <1             |
| Care for children<18 or elderly? | **Missing = 27** |                |
| Yes                      |               | 268              | 25             |
| No                       |               | 794              | 73             |
| If yes, how many do you care for? | **Missing = 5 (263 of 268)** |                |
| 0                        |               | 2                | 1              |
| 1                        |               | 110              | 41             |
| 2                        |               | 98               | 37             |
| 3                        |               | 34               | 13             |
| 4                        |               | 17               | 6              |
| 5                        |               | 2                | 1              |
| Location ***             | **Missing = 9** |                |
| City/Big town            |               | 436              | 40             |
| Countryside/Village      |               | 419              | 38             |
| Small town               |               | 215              | 20             |
| Other                    |               | 10               | 1              |
| Number of cars in household | **Missing = 10** |                |
| 0                        |               | 120              | 11             |
| 1                        |               | 499              | 46             |
| ≥2                       |               | 460              | 42             |
| Current accommodation    | **Missing = 14** |                |
| Owned                    |               | 572              | 53             |
| Mortgage                 |               | 309              | 28             |
| Rent local authority     |               | 88               | 8              |
| Rent private             |               | 73               | 7              |
Table 1. Cont.

|                                | Number (n) | Percentage (%) |
|--------------------------------|------------|----------------|
| Other                          | 33         | 3              |
| Education ** Missing = 42      |            |                |
| No formal education            | 16         | 1              |
| Primary school                 | 160        | 15             |
| Junior/Intermediate            | 213        | 20             |
| Leaving certificate            | 236        | 22             |
| Post-diploma/cert              | 203        | 19             |
| University degree              | 106        | 10             |
| Higher degree                  | 113        | 10             |
| Occupation Missing = 34        |            |                |
| Full time                      | 157        | 14             |
| Part time                      | 83         | 8              |
| Homemaker                      | 143        | 13             |
| Self-employed                  | 84         | 8              |
| Retired                        | 344        | 32             |
| Student                        | 6          | 1              |
| Sick, can’t work               | 173        | 16             |
| Unemployed                     | 47         | 4              |
| Other                          | 18         | 2              |
| Earning status Missing = 197   |            | 18             |
| Main earner in 2 income house  | 95         | 9              |
| Sole earner                    | 93         | 9              |
| Not main earner in 2 income house | 135      | 12             |
| Not applicable                 | 569        | 52             |
| Language Missing = 12          |            | 1              |
| English native language        | 1041       | 96             |
| English not native, no translator required | 30 | 3 |
| English not native sometimes/always need translator | 6 | 1 |

*Irish Travellers are a traditionally itinerant wayfaring ethnic group. **Tertiary level education = third-level education (in the Irish context, below tertiary level includes the following groups: no formal education, primary school, junior/intermediate certificate, and leaving certificate). ***Location groupings were approximated to location of cancer centres.

3. Results

3.1. Demographic Details

A total of 1089 adult questionnaires were returned. Patients in the sample had a median age of 60 years (IQR; 50–69 years). Most patients were female (64%) and married or in a long-term relationship (71%), with 16% of patients living alone. Most patients were Irish (94%) and native English speakers (96%). Over half (58%) of patients had below tertiary levels of education, 30% were in some form of employment and 60% lived in an urban setting (Table 1).
3.2. Measure of Wellbeing Using the EORTC EQ-5D-5L Instrument

The median score on the visual analogue scale with endpoints of 100 being ‘best health you can imagine’ to zero being the ‘worst health you can imagine’ was 75 (IQR 60–85). We used the EQ-5D five dimensions (mobility, i.e., ability to walk, self-care, usual activity, pain/discomfort and anxiety/depression), scoring them into five levels (no problem, slight problem, moderate problem, severe problem and extreme problem). Dimensions were collapsed for analysis into two groups—patients with and without a problem. Most patients (70%) reported having no mobility problems (based on ability to walk) and levels of mobility problems increased with age ($X^2 = 22.69; \ p < 0.0001$) and were slightly higher in widowed patients ($X^2 = 7.82; \ p = 0.050$) even after adjusting for age. Self-care issues were reported in 10% of patients, with proportions slightly higher in those only educated to primary school level ($X^2 = 17.47; \ p = 0.015$). Over half (55%) of patients reported having pain/discomfort and 38% conveyed anxiety/depression. Patients aged 41–60 years reported more pain/discomfort and younger patients ($<50$ years) had slightly more anxiety/depression ($X^2 = 14.51; \ p = 0.006, X^2 = 39.00; \ p < 0.0001$). Females had more anxiety and depression than males ($X^2 = 13.49; \ p < 0.0001$). No statistical difference was observed between groups in carrying out the dimension ‘usual activity’ (Table 2).

| N = 1089 | No Problem | Has Problem | Total | $X^2$ | p     |
|----------|------------|-------------|-------|-------|-------|
| Ability to walk (mobility) | n (%) | n (%) | n (%) |       |       |
| Missing = 15 | 766 (70)  | 308 (22)  | 1074 (98) |       |       |
| Age group |       |       |       |       |       |
| <40 years | 90 (92) | 8 (8) | 98 (100) | 22.69 | <0.0001 |
| 41–50 years | 127 (72) | 49 (28) | 176 (100) |       |       |
| 51–60 years | 191 (70) | 82 (30) | 273 (100) |       |       |
| 61–70 years | 209 (69) | 95 (31) | 304 (100) |       |       |
| >71 years | 140 (68) | 66 (32) | 206 (100) |       |       |
| Total | 757 (72) | 300 (28) | 1057 (100) |       |       |
| Marital status |       |       |       |       |       |
| Married | 555 (72) | 213 (28) | 768 (100) | 7.82 | 0.050 |
| Separated/divorced | 54 (69) | 24 (31) | 78 (100) |       |       |
| Single | 95 (75) | 31 (35) | 126 (100) |       |       |
| Widowed | 58 (60) | 39 (40) | 97 (100) |       |       |
| Total | 762 (71) | 307 (29) | 1069 (100) |       |       |
| Self-care | 964 (88) | 110 (10) | 1074 (98) |       |       |
| Marital status |       |       |       |       |       |
| Married | 693 (90) | 76 (10) | 769 (100) | 9.44 | 0.024 |
| Separated/divorced | 69 (90) | 8 (10) | 77 (100) |       |       |
| Single | 118 (94) | 8 (6) | 126 (100) |       |       |
| Widowed | 79 (81) | 18 (19) | 97 (100) |       |       |
| Total | 959 (90) | 110 (10) | 1069 (100) |       |       |
| Education |       |       |       |       |       |
| No formal education | 15 (100) | 0 (0) | 15 (100) | 17.47 | 0.015 |
| Primary school | 129 (82) | 29 (18) | 158 (100) |       |       |
| Junior/Intermediate cert | 194 (92) | 16 (8) | 210 (100) |       |       |
| Leaving cert | 213 (92) | 18 (8) | 231 (100) |       |       |
| Post-leaving dip/cert | 180 (90) | 20 (10) | 200 (100) |       |       |
| University—primary degree | 97 (92) | 9 (8) | 106 (100) |       |       |
| University—higher degree | 97 (87) | 15 (13) | 112 (100) |       |       |
| Total | 925 (90) | 107 (10) | 1032 (100) |       |       |
Table 2. Cont.

| N = 1089 | No Problem | Has Problem | Total | X² | p  |
|----------|------------|-------------|-------|----|----|
| Pain/discomfort | 472 (43) | 600 (55) | 1072 (98) | 14.51 | 0.006 |
| Age group | Missing = 33 |
| <40 years | 47 (47) | 52 (53) | 99 (100) |
| 41–50 years | 66 (37) | 112 (63) | 178 (100) |
| 51–60 years | 102 (37) | 170 (63) | 272 (100) |
| 61–70 years | 153 (51) | 149 (49) | 302 (100) |
| >71 years | 95 (46) | 110 (54) | 205 (100) |
| Total | 463 (44) | 593 (56) | 1056 (100) |
| Anxiety/depression | 650 (60) | 420 (38) | 1071 (98) | 39.00 | <0.0001 |
| Age group | Missing = 35 |
| <40 years | 49 (49) | 50 (51) | 99 (100) |
| 41–50 years | 90 (51) | 87 (49) | 177 (100) |
| 51–60 years | 146 (54) | 126 (46) | 272 (100) |
| 61–70 years | 205 (68) | 98 (32) | 303 (100) |
| >71 years | 150 (74) | 53 (26) | 203 (100) |
| Total | 640 (61) | 414 (39) | 1054 (100) |
| Sex | Missing = 25 |
| Male | 260 (68) | 122 (32) | 382 (100) |
| Female | 386 (57) | 296 (43) | 682 (100) |
| Total | 646 (61) | 418 (39) | 1064 (100) |
| Employment | Missing = 77 (excl. student n = 6 and others n = 18) |
| Full time | 100 (65) | 55 (35) | 155 (100) |
| Part time | 46 (55) | 37 (45) | 83 (100) |
| Homemaker | 74 (52) | 68 (48) | 142 (100) |
| Self-employed | 53 (64) | 30 (36) | 83 (100) |
| Retired | 219 (66) | 114 (34) | 333 (100) |
| Sick, can’t work | 103 (60) | 68 (40) | 171 (100) |
| Unemployed | 22 (49) | 23 (51) | 45 (100) |
| Total | 617 (61) | 395 (39) | 1012 (100) |

Visual scale of patient's health 0–100, where 0 = worst health, 100 = best health

| N | Mean | Median | IQR |
|---|------|--------|-----|
| Health | 1038 | 72.6 | 75 | 60–85 |

Mobility refers to ‘ability to walk’. Only results at p-value ≤ 5% are presented. Due to rounding, numbers and percentages may not add up precisely to totals. Analysis excludes missing numbers.

3.3. Participation

Of the 1089 patients, 66% reported never being offered the option to take part in a CCT and only 5% (34/741) of those not offered asked about taking part. Of the 345 patients that were offered/asked to take part in CCTs, 79% participated. The majority (87%) of patients that received an explanation about CCTs understood it and 70% found the patient information leaflet easy to understand. However, 16% of patients invited to participate in CCTs reported not receiving an information leaflet. Just under half (48%) of patients made their decision on whether to participate in a CCT by themselves, 35% used help/support and 5% indicated that they would have liked help but did not have it. The main source of help came from family members (84%). For 53% of patients, participation in CCTs impacted positively on their quality of life, while 3% reported a negative effect. Only 33 patients (12%) were given the results of the published CCT. Information booklets and having a patient navigator were the main preferences for decision aids that participants felt may have helped when making a decision about CCT participation (Table 3).
Table 3. Participation and Perception of Cancer Clinical Trials.

| Question | Number (n) | Percentage (%) |
|----------|------------|----------------|
| F1. Were you offered the option to take part in a CCT? | | |
| Yes | 311 | 29 |
| No | 716 | 66 |
| Do not remember | 25 | 2 |
| Missing | 37 | 3 |
| Total | 1089 | 100 |

Question F2 based on ‘no’ and ‘don’t remember’ responses to F1

| Question | Number (n) | Percentage (%) |
|----------|------------|----------------|
| F2. Did you ever ask to take part in a CCT? | | |
| Yes | 34 | 5 |
| No | 700 | 94 |
| Missing | 7 | 1 |
| Total | 741 | 100 |

Questions F3 to F8 based on those that responded yes in F1 + F2

| Question | Number (n) | Percentage (%) |
|----------|------------|----------------|
| F3. The trial was explained to me by: | | |
| My consultant | 206 | 60 |
| A junior doctor | 15 | 4 |
| A research nurse | 189 | 55 |
| Other | 18 | 5 |
| Total | 345 | 100 |

| Question | Number (n) | Percentage (%) |
|----------|------------|----------------|
| F4. Who should have explained CCTs to you? | | |
| My consultant | 204 | 59 |
| A junior doctor | 8 | 2 |
| Research nurse | 148 | 43 |
| Other | 9 | 3 |
| Total | 345 | 100 |

| Question | Number (n) | Percentage (%) |
|----------|------------|----------------|
| F5. Did you understand the explanation well? | | |
| Yes | 302 | 87 |
| No | 16 | 5 |
| Missing | 27 | 8 |
| Total | 345 | 100 |

| Question | Number (n) | Percentage (%) |
|----------|------------|----------------|
| F6. Was the CCT information leaflet easy to understand? | | |
| Yes | 243 | 70 |
| No | 18 | 5 |
| Not offered leaflet | 55 | 16 |
| Missing | 29 | 9 |
| Total | 345 | 100 |

| Question | Number (n) | Percentage (%) |
|----------|------------|----------------|
| F7. What decision aids would have helped? | | |
| Information booklet | 181 | 52 |
| Educational video | 59 | 17 |
| Patient navigator | 138 | 40 |
| Question prompt list | 81 | 23 |
| No decision aid required | 64 | 18 |
| Total | 345 | 100 |

| Question | Number (n) | Percentage (%) |
|----------|------------|----------------|
| F8. I made the decision about participation in the CCT by: | | |
| Myself without help | 167 | 48 |
| After using help or support | 121 | 35 |
| No help but would have liked help | 16 | 5 |
| Missing | 41 | 12 |
| Total | 345 | 100 |
Table 3. Cont.

Table Has Different Denominators, as Some Questions Were Only Relevant to Specific Groups, Depending on Previous Responses

| Number (n) | Percentage (%) |
|------------|----------------|

### Questions F9 and F10 are based on respondents of F8 that reported using help/support

**F9. If you had help in F8, what sources did you use? **

| Source                                      | Number | Percentage |
|---------------------------------------------|--------|------------|
| Family                                      | 102    | 84         |
| GP                                          | 31     | 26         |
| The internet                                | 15     | 12         |
| Cancer Support Centre                        | 19     | 16         |
| The Daffodil Centre                          | 3      | 2          |
| The Irish Cancer Society                    | 6      | 5          |
| Asking patients with the disease through an online support group | 5 | 4 |
| Other                                       | 37     | 30         |

**F10. Did your support in F9 encourage you to participate?**

| Support Type                           | Number (n) | Percentage (%) |
|----------------------------------------|------------|----------------|
| Encourage you to participate            | 85         | 70             |
| Discourage you from participating       | 1          | 1              |
| Neither encourage/discourage            | 28         | 23             |
| Some encouraged/discouraged             | 7          | 6              |
| **Total**                               | **121**    | **100**        |

### Questions F12 to F13 are based on those that responded yes in F1 + F2

**F12. What was the outcome of the offer to participate in the CCT?**

| Outcome                          | Number (n) | Percentage (%) |
|----------------------------------|------------|----------------|
| Accepted offer and participated  | 271        | 79             |
| Declined offer to participate    | 12         | 3              |
| Accepted but was ineligible      | 19         | 6              |
| Missing                          | 43         | 12             |
| **Total**                        | **345**    | **100**        |

**F13. Regarding your decision to take part in a CCT, were you satisfied with the decision?**

| Satisfaction                     | Number (n) | Percentage (%) |
|----------------------------------|------------|----------------|
| Dissatisfied                     | 3          | 1              |
| Neither dissatisfied/satisfied   | 29         | 8              |
| Satisfied                        | 267        | 77             |
| Missing                          | 46         | 13             |
| **Total**                        | **345**    | **100**        |

### Questions G1 to G8 are based on those that took part in a CCT (F12), n = 262

**G1. My experience on a CCT was positive**

| Strongly disagree | Number (n) | Percentage (%) |
|-------------------|------------|----------------|
|                   | 0          | 0              |
| Disagree          | 0          | 0              |
| Unsure            | 15         | 6              |
| Agree             | 93         | 34             |
| Strongly Agree    | 131        | 48             |
| Missing           | 32         | 12             |
| **Total**         | **271**    | **100**        |

**G2. My experience on the CCT was what I expected**

| Expected | Number (n) | Percentage (%) |
|----------|------------|----------------|
| Yes      | 216        | 80             |
| No       | 22         | 8              |
| Missing  | 33         | 12             |
| **Total**| **271**    | **100**        |
Table 3. Cont.

Table Has Different Denominators, as Some Questions Were Only Relevant to Specific Groups, Depending on Previous Responses

| Number (n) | Percentage (%) |
|------------|----------------|
| **G3. I would participate in a CCT again?** | |
| Yes        | 233             | 86   |
| No         | 4               | 1    |
| Missing    | 34              | 13   |
| Total      | 271             | 100  |

| **G4. I would you recommend CCT participation to others** | |
|-------------------------------------------------------|----------------|
| Yes                                                   | 231             | 85   |
| No                                                    | 6               | 2    |
| Missing                                               | 34              | 13   |
| Total                                                 | 271             | 100  |

| **G5. What was the effect of the CCT on your quality of life?** | |
|---------------------------------------------------------------|----------------|
| Positive affect                                               | 145             | 53   |
| Negative affect                                               | 8               | 3    |
| No affect                                                     | 89              | 33   |
| Missing                                                       | 29              | 11   |
| Total                                                         | 271             | 100  |

| **G6. Was too much paperwork required for the CCT?** | |
|-----------------------------------------------------|----------------|
| Yes                                                 | 24              | 9    |
| No                                                  | 216             | 80   |
| Missing                                             | 31              | 11   |
| Total                                               | 271             | 100  |

| **G7. There were too many hospital visits involved in the CCT** | |
|-------------------------------------------------------------|----------------|
| Yes                                                         | 26              | 10   |
| No                                                          | 215             | 79   |
| Missing                                                     | 30              | 11   |
| Total                                                       | 271             | 100  |

| **G8. I received the published results of the CCT?** | |
|-----------------------------------------------------|----------------|
| Yes                                                 | 33              | 12   |
| No, but would like to have them                     | 174             | 64   |
| No and do not want to know                           | 25              | 9    |
| Missing                                             | 39              | 15   |
| Total                                               | 271             | 100  |

* Participants may have selected more than one source, and therefore data will not add up to 100%. Table relates to sections 'F and G' in questionnaire Due to rounding numbers and percentages may not add up precisely to totals.

3.4. Patient Understanding of Concepts Used in Clinical Trials

All patients were asked whether they understood the term “clinical or medical trial”—this follows finding from the IPPOSI report of the Irish public where misunderstanding between medical and clinical research was prevalent [15]. Based on a binary response (yes/no), 77% of all surveyed patients understood the term, and this compares with 73% of the Irish public. In the public study, awareness was lower in males, in younger age groups and in lower socioeconomic status groups. In our patient sample, we found no significant differences in understanding between males and females or between socioeconomic groups, but did find that levels of understanding of the term were lower in older (X² = 10.72; p = 0.003), widowed (X² = 12.68; p = 0.005) and patients living in small towns (X² = 7.98; p = 0.018).
Understanding of CCT methodology and clinical equipoise is known to cause problems for the public. When asked whether a randomised trial treatment is decided by chance, 39% of patients thought it was not and an additional 24% did not know. There were differences in understanding by age ($X^2 = 30.23; p < 0.0001$), ethnicity ($X^2 = 6.70; p = 0.035$) and marital status ($X^2 = 16.20; p = 0.013$). Less than half (48%) understood that CCTs were not only an option when standard of care treatment had failed. Proportions that understood this was lower in older age groups ($X^2 = 44.85; p < 0.0001$), in single and widowed patients ($X^2 = 19.37; p = 0.004$) and the self-employed ($X^2 = 27.24; p = 0.007$). Fifty-eight percent of all patients and 61% of previous CCT participants thought that their doctor would ensure better treatment in a CCT. This was slightly higher in those with only tertiary education and in older age groups ($X^2 = 22.08; p = 0.037$, $X^2 = 45.38; p < 0.0001$), (Table 4).

Table 4. Understanding of Clinical Trial Methodology.

| Do you understand the term “clinical or medical trial”? | n = 1089 |  |  |  |  |  |
|--------------------------------------------------------|----------|---|---|---|---|---|
| Missing = 68                                           | Yes n (%) | No n (%) | Don’t Know n (%) | Total n (%) | $X^2$ | p |
| Age group                                              |          |      |                |             |      |   |
| <40 years                                               | 87 (90) | 10 (10) | -              | 97 (100)    | 10.72 | 0.003 |
| 41–50 years                                             | 146 (84) | 27 (16) | -              | 173 (100)   |       |   |
| 51–60 years                                             | 221 (86) | 37 (14) | -              | 258 (100)   |       |   |
| 61–70 years                                             | 228 (80) | 57 (20) | -              | 285 (100)   |       |   |
| >71 years                                               | 149 (77) | 44 (23) | -              | 193 (100)   |       |   |
| Total                                                   | 831 (83) | 175 (17) | -              | 1006 (100)  |       |   |
| Marital status                                          |          |      |                |             |      |   |
| Married                                                 | 616 (85) | 112 (15) | -              | 728 (100)   | 12.68 | 0.005 |
| Separate/divorced                                       | 59 (81) | 14 (19) | -              | 73 (100)    |       |   |
| Single                                                  | 93 (77) | 28 (23) | -              | 121 (100)   |       |   |
| Widowed                                                 | 68 (72) | 27 (28) | -              | 95 (100)    |       |   |
| Total                                                   | 836 (82) | 181 (18) | -              | 1017 (100)  |       |   |
| Location *                                              |          |      |                |             |      |   |
| City/Big town                                           | 355 (86) | 60 (14) | -              | 415 (100)   | 7.98  | 0.018 |
| Countryside/Village                                     | 322 (82) | 70 (18) | -              | 392 (100)   |       |   |
| Small town                                              | 151 (76) | 47 (24) | -              | 198 (100)   |       |   |
| Total                                                   | 828 (82) | 177 (18) | -              | 1005 (100)  |       |   |
| In a RCT treatment is decided by chance                 |          |      |                |             |      |   |
| Missing = 64                                            | 344 (32) | 425 (39) | 256 (24)      | 1025 (94)   | 30.23 | <0.0001 |
| Age group                                              |          |      |                |             |      |   |
| <40 years                                               | 45 (46) | 44 (45) | 9 (9)          | 98 (100)    |       |   |
| 41–50 years                                             | 67 (40) | 67 (40) | 35 (20)       | 169 (100)   |       |   |
| 51–60 years                                             | 85 (32) | 118 (44) | 63 (24)      | 266 (100)   |       |   |
| 61–70 years                                             | 88 (31) | 123 (43) | 75 (26)      | 286 (100)   |       |   |
| >71 years                                               | 56 (29) | 68 (36) | 67 (35)       | 191 (100)   |       |   |
| Total                                                   | 341 (34) | 420 (41) | 249 (25)   | 1010 (100)  |       |   |
| Ethnicity                                               |          |      |                |             |      |   |
| Irish                                                   | 311 (32) | 402 (42) | 247 (26)     | 960 (100)   | 6.70  | 0.035 |
| Others                                                  | 27 (47) | 22 (39) | 8 (14)        | 57 (100)    |       |   |
| Total                                                   | 338 (33) | 424 (42) | 255 (25)   | 1017 (100)  |       |   |
Table 4. Cont.

| Marital status                  | Marital status                  |
|---------------------------------|---------------------------------|
| Missing                         | Missing                         |
| Married                         | 256 (35)                        |
| Separate/divorced               | 22 (30)                         |
| Single                          | 36 (30)                         |
| Widowed                         | 26 (28)                         |
| Total                           | 340 (33)                        |
| n = 1089                         | 1921 12 of 26                   |
| Yes n (%)                       | 316 (43)                        |
| No n (%)                        | 32 (31)                         |
| Don’t Know n (%)                | 50 (41)                         |
| Total n (%)                     | 425 (42)                        |
| X²                              | 16.20                           |
| p                               | 0.013                           |

CCT only used when standard treatments have not worked

| Missing = 63                     | Missing = 63                     |
|---------------------------------|---------------------------------|
| Marital status                  |                                 |
| Missing                         |                                 |
| Married                         | 226 (21)                        |
| Separate/divorced               | 527 (48)                        |
| Single                          | 273 (25)                        |
| Total                           | 1026 (94)                       |
| Age group                       |                                 |
| Missing                         |                                 |
| <40 years                       | 15 (15)                         |
| 41–50 years                     | 31 (18)                         |
| 51–60 years                     | 68 (26)                         |
| 61–70 years                     | 64 (22)                         |
| >71 years                       | 44 (23)                         |
| Total                           | 340 (33)                        |
| CCTs test treatments that nobody knows anything about
| Missing = 63                     |                                 |
| Marital status                  |                                 |
| Missing                         |                                 |
| Married                         | 163 (22)                        |
| Separate/divorced               | 7 (9)                           |
| Single                          | 30 (25)                         |
| Widowed                         | 23 (25)                         |
| Total                           | 223 (22)                        |
| Age group                       |                                 |
| Missing                         |                                 |
| <40 years                       | 21 (14)                         |
| 41–50 years                     | 17 (22)                         |
| 51–60 years                     | 21 (16)                         |
| 61–70 years                     | 23 (25)                         |
| >71 years                       | 7 (9)                           |
| Total                           | 141 (14)                        |
| Employment                      |                                 |
| Missing                         |                                 |
| Full time                       | 21 (14)                         |
| Part time                       | 17 (22)                         |
| Homemaker                       | 21 (16)                         |
| Self-employed                   | 25 (31)                         |
| Retired                         | 74 (23)                         |
| Sick, can’t work                | 35 (22)                         |
| Unemployed                      | 12 (25)                         |
| Total                           | 205 (21)                        |
| Location **                     |                                 |
| Missing                         |                                 |
| City/Big town                   | 55 (13)                         |
| Countryside/Village             | 46 (12)                         |
| Small town                      | 1 (12)                          |
| Other                           | 39 (20)                         |
| Total                           | 141 (14)                        |
| Table 4. Cont. |
|----------------|
| **n = 1089** |
| **Yes n (%)** | **No n (%)** | **Don’t Know n (%)** | **Total n (%)** | **X²** | **p** |
| **Uptake of CCT *** | **NOTE the denominator = 345; missing = 58** |
| Accepted offer and participated | 30 (12) | 191 (74) | 37 (14) | 258 (100) | 15.88 | 0.015 |
| Declined offer to participate | 0 (0) | 5 (45) | 6 (55) | 11 (100) | 15.88 | 0.015 |
| Accepted but was ineligible | 1 (6) | 16 (89) | 1 (6) | 18 (100) | 15.88 | 0.015 |
| Total | 31 (11) | 212 (74) | 44 (15) | 287 (100) | 15.88 | 0.015 |
| **CCTs are not appropriate for diseases like cancer** | **Missing = 62** |
| Age group | | | | |
| <40 years | 2 (2) | 86 (87) | 11 (11) | 99 (100) | 31.57 | <0.0001 |
| 41–50 years | 8 (5) | 138 (81) | 25 (15) | 171 (100) | 31.57 | <0.0001 |
| 51–60 years | 12 (5) | 206 (77) | 48 (18) | 266 (100) | 31.57 | <0.0001 |
| 61–70 years | 21 (7) | 189 (67) | 74 (26) | 284 (100) | 31.57 | <0.0001 |
| >71 years | 14 (7) | 124 (64) | 55 (29) | 193 (100) | 31.57 | <0.0001 |
| Total | 57 (6) | 743 (73) | 213 (21) | 1013 (100) | 31.57 | <0.0001 |
| **My doctor would know which treatment in a CCT was better** | **Missing = 62** |
| Age group | | | | |
| <40 years | 37 (38) | 33 (34) | 28 (28) | 98 (100) | 37.58 | <0.0001 |
| 41–50 years | 80 (47) | 44 (26) | 45 (27) | 169 (100) | 37.58 | <0.0001 |
| 51–60 years | 147 (56) | 61 (23) | 56 (21) | 264 (100) | 37.58 | <0.0001 |
| 61–70 years | 185 (64) | 46 (16) | 59 (20) | 290 (100) | 37.58 | <0.0001 |
| >71 years | 123 (64) | 24 (13) | 44 (23) | 191 (100) | 37.58 | <0.0001 |
| Total | 572 (57) | 208 (20) | 232 (23) | 1012 (100) | 37.58 | <0.0001 |
| **Marital status** | **Missing = 67** |
| Married | 412 (56) | 149 (20) | 173 (24) | 734 (100) | 14.11 | 0.028 |
| Separated/divorced | 34 (46) | 24 (32) | 16 (22) | 74 (100) | 14.11 | 0.028 |
| Single | 68 (56) | 27 (22) | 27 (22) | 122 (100) | 14.11 | 0.028 |
| Widowed | 62 (67) | 9 (10) | 21 (23) | 92 (100) | 14.11 | 0.028 |
| Total | 576 (56) | 209 (21) | 237 (23) | 1022 (100) | 14.11 | 0.028 |
| **My doctor would ensure that I get better treatment in a CCT** | **Missing = 50** |
| Age group | | | | |
| <40 years | 39 (39) | 30 (30) | 30 (30) | 99 (100) | 45.38 | <0.0001 |
| 41–50 years | 89 (52) | 44 (25) | 39 (23) | 172 (100) | 45.38 | <0.0001 |
| 51–60 years | 165 (62) | 55 (20) | 47 (18) | 267 (100) | 45.38 | <0.0001 |
| 61–70 years | 190 (65) | 38 (13) | 64 (22) | 292 (100) | 45.38 | <0.0001 |
| >71 years | 138 (71) | 20 (10) | 36 (19) | 194 (100) | 45.38 | <0.0001 |
| Total | 621 (100) | 187 (100) | 216 (100) | 1024 (100) | 45.38 | <0.0001 |
| **Education ***** | **Missing = 90** |
| No formal | 9 (60) | 1 (7) | 5 (33) | 15 (100) | 22.08 | 0.037 |
| Primary school | 98 (65) | 25 (16) | 29 (19) | 152 (100) | 22.08 | 0.037 |
| Junior/Intermediate cert | 143 (72) | 23 (11) | 34 (17) | 200 (100) | 22.08 | 0.037 |
| Leaving cert | 127 (57) | 50 (22) | 47 (21) | 224 (100) | 22.08 | 0.037 |
| Post-leaving dip/cert | 121 (61) | 39 (20) | 38 (19) | 198 (100) | 22.08 | 0.037 |
| Primary degree | 58 (58) | 17 (17) | 25 (25) | 100 (100) | 22.08 | 0.037 |
| Higher degree | 56 (51) | 26 (24) | 28 (25) | 110 (100) | 22.08 | 0.037 |
| Total | 612 (61) | 181 (18) | 206 (21) | 999 (100) | 22.08 | 0.037 |
### Table 4. Cont.

| Employment                      | Missing = 107 (excl. student n = 6 and others n = 18) |
|--------------------------------|-----------------------------------------------------|
| Full time                       | 73 (49) 42 (28) 35 (23) 150 (100)                   |
| Part time                       | 48 (61) 14 (18) 16 (21) 78 (100)                     |
| Homemaker                       | 85 (62) 24 (18) 27 (20) 136 (100)                    |
| Self-employed                   | 55 (67) 13 (16) 14 (17) 82 (100)                     |
| Retired                          | 218 (67) 46 (14) 63 (19) 327 (100)                   |
| Sick, can’t work                 | 93 (57) 26 (16) 43 (27) 162 (100)                    |
| Unemployed                       | 30 (64) 7 (15) 10 (21) 47 (100)                      |
| Total                           | 602 (61) 172 (18) 208 (21) 982 (100)                 |

**Table 5.** Factors Influencing Decision to Participate in Cancer Clinical Trials.

| Chance to advance cancer research to help others | 845 (78) | 244 (22) | 1089 (100) |
|-------------------------------------------------|----------|----------|------------|
| Age group                                       |          |          |            |
| <40 years                                       | 91 (92)  | 8 (8)    | 99 (100)   |
| 41–50 years                                     | 152 (85) | 27 (15)  | 179 (100)  |
| 51–60 years                                     | 227 (83) | 48 (17)  | 275 (100)  |
| 61–70 years                                     | 227 (74) | 81 (26)  | 308 (100)  |
| >71 years                                       | 135 (64) | 75 (36)  | 210 (100)  |
| Total                                           | 832 (78) | 239 (22) | 1071 (100) |

**Marital status**

| Marital status                  | Missing = 7 |
|---------------------------------|-------------|
| Married                         | 622 (80)    | 156 (20)  | 778 (100)  |
| Separate/divorced              | 62 (79)     | 16 (21)   | 78 (100)   |
| Single                          | 102 (79)    | 27 (21)   | 129 (100)  |
| Widowed                         | 54 (56)     | 43 (44)   | 97 (100)   |
| Total                           | 840 (78)    | 242 (22)  | 1082 (100) |

3.5. Factors Influencing Patient’s Decision to Participate in a Cancer Clinical Trial

The opportunity to advance cancer research (78%), possibility of feeling better and living longer (78%) and an oncologist recommendation (73%) were all positive influencing factors reported by patients considering CCT participation. Fear of the unknown and perceived risk of side effects can be a barrier to CCT participation. We found that 35% of patients reported fear of more side effects, 31% feared harm or death and 22% had a fear of being a human guinea pig as concerns for CCT participation. Of those that reported these fear factors, proportions were slightly higher in females ($X^2 = 5.24; p = 0.022, X^2 = 8.40; p = 0.004$). Females also expressed more concerns about additional hospital visits and distance to travel to participate in CCTs. More younger (<50 years) than older patients feared harm or death and had more concerns about whether the CCT treatment would work ($X^2 = 18.93; p = 0.001, X^2 = 45.00; p < 0.0001$), (Table 5).

* The ‘other’ category excluded in ‘Location’ due to small numbers. ** A total of 345 participants answered the outcome of being offered a CCT. RCT = randomised control trial, CCT = cancer clinical trial. *** Tertiary level education = third-level education (in the Irish context, below tertiary level includes the following groups: no formal education, primary school, junior/intermediate certificate, and leaving certificate)
Table 5. Cont.

| Education | Missing = 42 | n = 1089 | Yes (%) | No (%) | Total (%) | X² | p |
|-----------|--------------|----------|---------|--------|-----------|----|---|
| No formal | 11 (69)      | 5 (31)   | 16 (100) |
| Primary school | 117 (73) | 43 (27) | 160 (100) |
| Junior/Intermediate cert | 153 (72) | 60 (28) | 213 (100) |
| Leaving cert | 188 (80) | 48 (20) | 236 (100) |
| Post-leaving dip/cert | 174 (86) | 29 (14) | 203 (100) |
| Primary degree | 82 (77) | 24 (23) | 106 (100) |
| Higher degree | 85 (75) | 28 (25) | 113 (100) |
| Total | 810 (77) | 237 (23) | 1047 (100) |

| Uptake of CCT | NOTE the denominator = 345; missing = 43 |
|--------------|---------------------------------|
| Accepted offer and participated | 235 (87) | 36 (13) | 271 (100) |
| Declined offer to participate | 8 (67) | 4 (33) | 12 (100) |
| Accepted but was ineligible | 19 (100) | 0 (0) | 19 (100) |
| Total | 262 (100) | 40 (100) | 302 (100) |

| Chance might feel better/live longer | Missing = 18 |
|-------------------------------------|--------------|
| <40 years | 88 (89) | 11 (11) | 99 (100) |
| 41–50 years | 159 (89) | 20 (11) | 179 (100) |
| 51–60 years | 231 (84) | 44 (16) | 275 (100) |
| 61–70 years | 241 (78) | 67 (22) | 308 (100) |
| >71 years | 119 (57) | 91 (43) | 210 (100) |
| Total | 838 (78) | 233 (22) | 1071 (100) |

| Marital status | Missing = 7 |
|----------------|-------------|
| Married | 627 (81) | 151 (19) | 778 (100) |
| Separate/divorced | 64 (82) | 14 (18) | 78 (100) |
| Single | 96 (74) | 33 (26) | 129 (100) |
| Widowed | 58 (60) | 39 (40) | 97 (100) |
| Total | 845 (78) | 237 (22) | 1082 (100) |

| Education | Missing = 42 |
|-----------|--------------|
| No formal | 12 (75) | 4 (25) | 16 (100) |
| Primary school | 117 (73) | 43 (27) | 160 (100) |
| Junior/Intermediate cert | 154 (72) | 59 (28) | 213 (100) |
| Leaving cert | 184 (78) | 52 (22) | 236 (100) |
| Post-leaving dip/cert | 173 (85) | 30 (25) | 203 (100) |
| Primary degree | 84 (79) | 22 (21) | 106 (100) |
| Higher degree | 90 (80) | 23 (20) | 113 (100) |
| Total | 814 (78) | 233 (22) | 1047 (100) |

| Recommendation from cancer doctor | Missing = 18 |
|----------------------------------|-------------|
| <40 years | 74 (75) | 25 (25) | 99 (100) |
| 41–50 years | 138 (77) | 41 (23) | 179 (100) |
| 51–60 years | 211 (77) | 64 (23) | 275 (100) |
| 61–70 years | 229 (74) | 79 (26) | 308 (100) |
| >71 years | 135 (64) | 75 (36) | 210 (100) |
| Total | 787 (73) | 284 (27) | 1071 (100) |
Table 5. Cont.

| Location                  | Yes (%) | No (%) | Total (%) | X²   | p     |
|---------------------------|---------|--------|-----------|------|-------|
| City/Big town             | 302 (69)| 134 (31)| 436 (100) | 7.87 | 0.020 |
| Countryside/Village       | 314 (75)| 105 (25)| 419 (100) |      |       |
| Small town                | 170 (79)| 45 (21) | 215 (100) |      |       |
| Total                     | 786 (73)| 284 (27)| 1070 (100)|      |       |

| Recommendation from GP    | Yes (%) | No (%) | Total (%) |
|---------------------------|---------|--------|-----------|
| Missing = 19, excludes ‘other’ n = 10 |

| Gender                   | Yes (%) | No (%) | Total (%) | X²   | p     |
|--------------------------|---------|--------|-----------|------|-------|
| Male                     | 143 (37)| 243 (63)| 386 (100) |      |       |
| Female                   | 215 (31)| 481 (69)| 696 (100) | 4.25 | 0.039 |
| Total                    | 358 (33)| 724 (67)| 1082 (100)|      |       |

| Uptake of CCT             | Yes (%) | No (%) | Total (%) | X²   | p     |
|---------------------------|---------|--------|-----------|------|-------|
| Accepted offer and        | 96 (35) | 175 (65)| 271 (100) | 7.66 | 0.012 |
| participated              |         |        |           |      |       |
| Declined offer to participate | 3 (25) | 9 (75) | 12 (100) |      |       |
| Accepted but was ineligible| 1 (5)  | 18 (95)| 19 (100) |      |       |
| Total                     | 100 (33)| 202 (67)| 302 (100)|      |       |

| Previous experience on    | Yes (%) | No (%) | Total (%) |
| clinical trial            |         |        |           |
|---------------------------|---------|--------|-----------|
| Missing = 345; missing = 43|

| Age group                 | Yes (%) | No (%) | Total (%) | X²   | p     |
|---------------------------|---------|--------|-----------|------|-------|
| <40 years                 | 13 (13) | 86 (87)| 99 (100)  |      |       |
| 41–50 years               | 43 (24) | 136 (76)| 179 (100)|      |       |
| 51–60 years               | 57 (21) | 218 (79)| 275 (100)| 10.14| 0.038 |
| 61–70 years               | 57 (19) | 251 (81)| 308 (100)|      |       |
| >71 years                 | 28 (13) | 182 (87)| 210 (100)|      |       |
| Total                     | 198 (18)| 873 (82)| 1071 (100)|      |       |

| Uptake of CCT             | Yes (%) | No (%) | Total (%) | X²   | p     |
|---------------------------|---------|--------|-----------|------|-------|
| Accepted offer and        | 113 (42)| 158 (58)| 271 (100) | 8.29 | 0.012 |
| participated              |         |        |           |      |       |
| Declined offer to participate | 3 (25) | 9 (75) | 12 (100) |      |       |
| Accepted but was ineligible| 2 (11) | 17 (89)| 19 (100) |      |       |
| Total                     | 118 (39)| 184 (61)| 302 (100)|      |       |

| Closer monitoring on      | Yes (%) | No (%) | Total (%) |
| clinical trial            |         |        |           |
|---------------------------|---------|--------|-----------|
| Missing = 345; missing = 43|

| Age group                 | Yes (%) | No (%) | Total (%) | X²   | p     |
|---------------------------|---------|--------|-----------|------|-------|
| <40 years                 | 49 (49) | 50 (51)| 99 (100)  |      |       |
| 41–50 years               | 106 (59)| 79 (41)| 179 (100)|      |       |
| 51–60 years               | 152 (55)| 123 (45)| 275 (100)| 37.83| <0.0001|
| 61–70 years               | 148 (48)| 160 (52)| 308 (100)|      |       |
| >71 years                 | 66 (31) | 144 (69)| 210 (100)|      |       |
| Total                     | 521 (49)| 550 (51)| 1071 (100)|      |       |

| Marital status            | Yes (%) | No (%) | Total (%) | X²   | p     |
|---------------------------|---------|--------|-----------|------|-------|
| Married                   | 400 (51)| 378 (49)| 778 (100) |      |       |
| Separate/divorced         | 36 (46) | 42 (54)| 78 (100)  |      |       |
| Single                    | 63 (49) | 66 (51)| 129 (100) | 22.88| <0.0001|
| Widowed                   | 25 (26) | 72 (74)| 97 (100)  |      |       |
| Total                     | 524 (48)| 558 (52)| 1082 (100)|      |       |
### Table 5. Cont.

|                          | n = 1089 | Yes (%) | No (%) | Total (%) | \(X^2\) | p    |
|--------------------------|----------|---------|--------|-----------|---------|------|
| **Education**            |          |         |        |           |         |      |
| No formal                | 7 (44)   | 9 (56)  | 16 (100)|           |         |      |
| Primary school           | 74 (47)  | 82 (53) | 156 (100)|           |         |      |
| Junior/Intermediate cert | 93 (44)  | 118 (56)| 211 (100)|           |         |      |
| Leaving cert             | 96 (41)  | 138 (59)| 234 (100)|           |         |      |
| Post-leaving dip/cert    | 117 (58) | 85 (42) | 202 (100)|           |         |      |
| Primary degree           | 53 (50)  | 53 (50) | 106 (100)|           |         |      |
| Higher degree            | 56 (50)  | 56 (50) | 112 (100)|           |         |      |
| Total                    | 496 (48) | 541 (52)| 1037 (100)|          |         |      |
| **Fear more side effects** | 300 (35) | 709 (73)| 1089 (100)|          |         |      |
| **Age group**            |          |         |        |           |         |      |
| <40 years                | 45 (45)  | 54 (55) | 99 (100)|           |         |      |
| 41–50 years              | 81 (45)  | 98 (55) | 179 (100)|           |         |      |
| 51–60 years              | 92 (33)  | 183 (66)| 275 (100)|           |         |      |
| 61–70 years              | 101 (33) | 207 (67)| 308 (100)|           |         |      |
| >71 years                | 58 (28)  | 152 (72)| 210 (100)|           |         |      |
| Total                    | 377 (35) | 694 (65)| 1071 (100)|          |         |      |
| **Gender**               |          |         |        |           |         |      |
| Male                     | 118 (31) | 268 (69)| 386 (100)|           |         |      |
| Female                   | 261 (36) | 435 (63)| 696 (100)|           |         |      |
| Total                    | 379 (35) | 703 (65)| 1082 (100)|          |         |      |
| **Uptake of CCT**        | NOTE the denominator = 345; missing = 43 |         |        |           |         |      |
| Accepted offer and      | 69 (25)  | 202 (75)| 271 (100)|           |         |      |
| participated             |          |         |        |           |         |      |
| Declined offer to       | 7 (58)   | 5 (42)  | 12 (100)|           |         |      |
| participate              |          |         |        |           |         |      |
| Accepted but was        | 6 (32)   | 13 (68) | 19 (100)|           |         |      |
| ineligible               |          |         |        |           |         |      |
| Total                    | 82 (27)  | 220 (73)| 302 (100)|           |         |      |
| **Fear harm/death**     | 336 (31) | 753 (69)| 1089 (100)|          |         |      |
| **Age group**            |          |         |        |           |         |      |
| <40 years                | 46 (46)  | 53 (54) | 99 (100)|           |         |      |
| 41–50 years              | 69 (39)  | 110 (61)| 179 (100)|           |         |      |
| 51–60 years              | 82 (30)  | 193 (70)| 275 (100)|           |         |      |
| 61–70 years              | 85 (28)  | 223 (72)| 308 (100)|           |         |      |
| >71 years                | 48 (23)  | 162 (77)| 210 (100)|           |         |      |
| Total                    | 330 (31) | 741 (69)| 1071 (100)|          |         |      |
| **Location**             | Missing = 19, excludes ‘other’ n = 10 |         |        |           |         |      |
| City/Big town            | 132 (30) | 304 (70)| 436 (100)|           |         |      |
| Countryside/Village      | 119 (28) | 300 (72)| 419 (100)|           |         |      |
| Small town               | 81 (38)  | 134 (62)| 215 (100)|           |         |      |
| Total                    | 332 (31) | 738 (69)| 1070 (100)|          |         |      |
| **Education**            | Missing = 42 |         |        |           |         |      |
| No formal                | 9 (56)   | 7 (44)  | 16 (100)|           |         |      |
| Primary school           | 63 (39)  | 97 (61) | 160 (100)|           |         |      |
| Junior/Intermediate cert | 48 (23)  | 165 (77)| 213 (100)|           |         |      |
| Leaving cert             | 73 (31)  | 163 (69)| 236 (100)|           |         |      |
| Post-leaving dip/cert    | 56 (28)  | 147 (72)| 203 (100)|           |         |      |
| Primary degree           | 32 (30)  | 74 (70) | 106 (100)|           |         |      |
| Higher degree            | 39 (35)  | 74 (65) | 113 (100)|           |         |      |
| Total                    | 320 (31) | 727 (69)| 1047 (100)|          |         |      |
### Table 5. Cont.

|                                | Yes (%) | No (%) | Total (%) | $X^2$ | $p$  |
|--------------------------------|---------|--------|-----------|-------|------|
| **Uptake of CCT**              |         |        |           |       |      |
| Accepted offer and participated | 66 (24) | 205 (76) | 271 (100) |       |      |
| Declined offer to participate   | 6 (50)  | 6 (50) | 12 (100)  | 6.42  | 0.040|
| Accepted but was ineligible      | 8 (42)  | 11 (58) | 19 (100)  |       |      |
| Total                           | 80 (26) | 222 (74) | 302 (100) |       |      |
| **Fear of being a human guinea pig** | 235 (22) | 854 (78) | 1089 (100) |       |      |
| **Gender**                      |         |        |           |       |      |
| Male                            | 65 (17) | 321 (83) | 386 (100) |       |      |
| Female                          | 170 (24) | 526 (76) | 696 (100) | 8.40  | 0.004|
| Total                           | 235 (22) | 847 (78) | 1082 (100) |       |      |
| **Concerns about whether the new treatment works** | 446 (41) | 643 (59) | 1089 (100) |       |      |
| **Age group**                   |         |        |           |       |      |
| <40 years                       | 63 (64) | 36 (36) | 99 (100)  |       |      |
| 41–50 years                     | 87 (49) | 92 (51) | 179 (100) |        |      |
| 51–60 years                     | 116 (42) | 159 (58) | 275 (100) | 45.00 | <0.0001|
| 61–70 years                     | 115 (37) | 193 (63) | 308 (100) |        |      |
| >71 years                       | 56 (27) | 154 (73) | 210 (100) |        |      |
| Total                           | 437 (41) | 634 (59) | 1071 (100) |       |      |
| **Marital status**              |         |        |           |       |      |
| Married                         | 311 (40) | 467 (60) | 778 (100) |       |      |
| Separate/divorced               | 31 (40) | 47 (60) | 78 (100)  |       |      |
| Single                          | 68 (53) | 61 (47) | 129 (100) | 9.66  | 0.022|
| Widowed                         | 33 (34) | 64 (66) | 97 (100)  |       |      |
| Total                           | 443 (41) | 639 (59) | 1082 (100) |       |      |
| **Education**                   |         |        |           |       |      |
| No formal                       | 4 (25) | 12 (75) | 16 (100)  |       |      |
| Primary school                  | 77 (48) | 83 (52) | 160 (100) |       |      |
| Junior/Intermediate cert         | 75 (35) | 138 (65) | 213 (100) |       |      |
| Leaving cert                    | 92 (39) | 144 (61) | 236 (100) | 12.89 | 0.045|
| Post-leaving dip/cert           | 96 (47) | 107 (53) | 203 (100) |        |      |
| Primary degree                  | 39 (37) | 67 (63) | 106 (100) |        |      |
| Higher degree                   | 43 (38) | 70 (62) | 113 (100) |        |      |
| Total                           | 426 (41) | 621 (59) | 1047 (100) |       |      |
| **Feel too weak to take part**  | 156 (14) | 933 (86) | 1089 (100) |       |      |
| **Gender**                      |         |        |           |       |      |
| Male                            | 40 (10) | 346 (90) | 386 (100) | 7.99  | 0.005|
| Female                          | 116 (17) | 580 (83) | 696 (100) |       |      |
| Total                           | 156 (14) | 926 (86) | 1082 (100) |       |      |
| **Time commitment**             |         |        |           |       |      |
| 163 (15) | 926 (85) | 1089 (100) |       |      |
| **Ethnicity**                   |         |        |           |       |      |
| Irish                           | 148 (15) | 871 (85) | 1019 (100) | 3.70  | 0.054|
| Others                          | 14 (24) | 45 (76) | 59 (100)  |       |      |
| Total                           | 162 (15) | 916 (85) | 1078 (100) |       |      |
| **Concern that there will be more hospital visits** | 291 (27) | 798 (73) | 1089 (100) |       |      |
Table 5. Cont.

|                   | Yes (%) | No (%) | Total (%) | $X^2$ | $p$  |
|-------------------|---------|--------|-----------|-------|------|
| **n = 1089**      |         |        |           |       |      |
| **Gender**        |         |        |           |       |      |
| Male              | 80 (21) | 306 (79) | 386 (100) | 11.30 | 0.001 |
| Female            | 210 (30) | 486 (70) | 696 (100) |       |      |
| Total             | 290 (27) | 792 (73) | 1082 (100) |       |      |
| **Concern over the distance to travel** | 194 (18) | 895 (82) | 1089 (100) |       |      |
| **Location**      |         |        |           |       |      |
| City/Big town     | 59 (14) | 377 (86) | 436 (100) | 9.60  | 0.008 |
| Countryside/Village | 85 (20) | 334 (80) | 419 (100) |       |      |
| Small town        | 47 (22) | 168 (78) | 215 (100) |       |      |
| Total             | 191 (18) | 879 (82) | 1070 (100) |       |      |
| **Needed more information** | 411 (38) | 678 (62) | 1089 (100) |       |      |
| **Age group**     |         |        |           |       |      |
| <40 years         | 44 (44) | 55 (56) | 99 (100)  | 11.66 | 0.020 |
| 41–50 years       | 80 (45) | 99 (55) | 179 (100) |       |      |
| 51–60 years       | 110 (40) | 165 (60) | 275 (100) |       |      |
| 61–70 years       | 99 (32) | 209 (68) | 308 (100) |       |      |
| >71 years         | 71 (34) | 139 (66) | 210 (100) |       |      |
| Total             | 404 (38) | 667 (62) | 1071 (100) |       |      |
| **Gender**        |         |        |           |       |      |
| Male              | 121 (31) | 265 (69) | 386 (100) | 10.34 | 0.001 |
| Female            | 287 (41) | 409 (59) | 696 (100) |       |      |
| Total             | 408 (38) | 674 (62) | 1082 (100) |       |      |

Yes, corresponds to number of patients that chose this factor, No corresponds to the remainder of patients in the sample.

3.6. Attitudes towards Cancer Clinical Trials

After receiving factual information about clinical research, the Irish public showed a willingness to engage in CCTs, but only a minority were willing to engage in therapeutic trials [15]. In our study, 66% of patient participants thought that cancer clinical research was a good idea, but this was lower in those aged >65 years ($X^2 = 31.46; p < 0.0001$), with this age group also less willing to participate in drug trials compared with younger patients. We found that 63% of patients would participate in CCTs with a new drug, but this was slightly lower (59%) for participation in a CCT with a new drug only tested on animals, and 70% indicated that they would be willing to participate in translational trials. More males than females would consider participating in CCTs to determine whether a new drug is better or the same as the usual treatment ($X^2 = 14.57; p = 0.001$), on drug trials with no standard treatment-only animal data ($X^2 = 11.76; p = 0.003$) and in translational trials ($X^2 = 7.48; p = 0.024$). The majority (89%) of patients were willing to supply personal information, an issue of concern raised by the Irish public [15], Table 6.
### Table 6. Willingness to Participate in Cancer Clinical Research.

| n = 1089 | Strongly Agree/Agree (%) | Strongly Disagree/Disagree (%) | Unsure (%) | Total (%) | X² | p |
|----------|--------------------------|-------------------------------|-----------|-----------|----|---|
| CCR to develop new ways to treat cancer is a good idea | 716 (66) | 70 (6) | 271 (25) | 1057 (97) | | |
| Missing = 32 | | | | | | |
| **Age group** | | | | | | |
| ≤65 years | 508 (72) | 26 (4) | 166 (24) | 700 (100) | 31.46 | <0.0001 |
| >65 years | 203 (59) | 40 (12) | 99 (29) | 342 (100) | | |
| Total | 711 (68) | 66 (6) | 265 (25) | 1042 (100) | | |
| **Uptake of CCT** | | | | | | |
| Accepted offer and participated | 245 (92) | 3 (1) | 17 (6) | 265 (100) | | |
| Declined offer to participate | 5 (45) | 1 (9) | 5 (45) | 11 (100) | 30.63 | <0.0001 |
| Accepted but was ineligible | 8 (80) | 1 (10) | 1 (10) | 10 (100) | | |
| Total | 258 (90) | 5 (2) | 23 (8) | 286 (100) | | |
| **Marital status** | | | | | | |
| Married | 519 (68) | 46 (6) | 194 (26) | 759 (100) | | |
| Separate/divorced | 59 (76) | 3 (4) | 16 (20) | 78 (100) | | |
| Single | 85 (67) | 5 (4) | 37 (29) | 127 (100) | 20.50 | 0.011 |
| Widowed | 51 (57) | 15 (17) | 23 (26) | 89 (100) | | |
| Total | 714 (68) | 69 (6) | 270 (26) | 1053 (100) | | |
| **Willing to donate blood for CCR** | | | | | | |
| Missing = 33 | | | | | | |
| **Age group** | | | | | | |
| ≤65 years | 596 (86) | 22 (4) | 73 (10) | 696 (100) | 23.92 | <0.0001 |
| >65 years | 261 (76) | 39 (11) | 44 (13) | 344 (100) | | |
| Total | 857 (82) | 66 (6) | 117 (11) | 1040 (100) | | |
| **Gender** | | | | | | |
| Male | 322 (86) | 26 (7) | 28 (7) | 376 (100) | 9.18 | 0.010 |
| Female | 539 (80) | 43 (6) | 92 (14) | 674 (100) | | |
| Total | 861 (82) | 69 (7) | 120 (11) | 1050 (100) | | |
| **Uptake of CCT** | | | | | | |
| Note the denominator = 345; missing = 50 | | | | | | |
| Accepted offer and participated | 246 (93) | 5 (2) | 13 (5) | 264 (100) | 13.24 | 0.017 |
| Declined offer to participate | 8 (67) | 1 (8) | 3 (25) | 12 (100) | | |
| Accepted but was ineligible | 18 (95) | 1 (5) | 0 (0) | 19 (100) | | |
| Total | 272 (92) | 7 (2) | 16 (5) | 295 (100) | | |
| **Willing to supply personal information for CCR** | | | | | | |
| Missing = 27 | | | | | | |
| **Location** | | | | | | |
| City/Big town | 397 (93) | 11 (3) | 19 (4) | 427 (100) | 18.89 | 0.001 |
| Countryside/Village | 381 (93) | 8 (2) | 20 (5) | 409 (100) | | |
| Small town | 176 (84) | 15 (7) | 18 (9) | 209 (100) | | |
| Total | 954 (91) | 34 (3) | 57 (5) | 1045 (100) | | |
| **Would participate in a CCT with a new drug compared to standard** | | | | | | |
| Missing = 36 | | | | | | |
| **Age group** | | | | | | |
| ≤65 years | 477 (68) | 26 (4) | 193 (28) | 696 (100) | 21.92 | <0.0001 |
| >65 years | 203 (60) | 37 (11) | 100 (29) | 341 (100) | | |
| Total | 681 (66) | 63 (6) | 293 (28) | 1037 (100) | | |
### Table 6. Cont.

|                      | Strongly Agree/Agree (%) | Strongly Disagree/Disagree (%) | Unsure (%) | Total (%) | X²   | p     |
|----------------------|--------------------------|--------------------------------|------------|-----------|------|-------|
| **n = 1089**         |                          |                                |            |           |      |       |
| **Gender**           |                          |                                |            |           |      |       |
| Male                 | 271 (73)                 | 21 (6)                         | 81 (22)    | 373 (100) | 14.57| 0.001 |
| Female               | 412 (61)                 | 45 (7)                         | 217 (32)   | 674 (100) |      |       |
| **Total**            | 683 (65)                 | 66 (6)                         | 298 (28)   | 1047 (100)|      |       |
| **Marital status**   |                          |                                |            |           |      |       |
| Married              | 508 (68)                 | 39 (5)                         | 204 (27)   | 751 (100) | 14.34| 0.026 |
| Separate/divorced   | 49 (64)                  | 3 (4)                          | 24 (32)    | 76 (100)  |      |       |
| Single               | 76 (60)                  | 12 (9)                         | 39 (31)    | 127 (100) |      |       |
| Widowed              | 52 (55)                  | 12 (13)                        | 30 (32)    | 94 (100)  |      |       |
| **Total**            | 685 (65)                 | 66 (6)                         | 297 (28)   | 1048 (100)|      |       |
| **Uptake of CCT**    |                          |                                |            |           |      |       |
| Accepted offer and   |                          |                                |            |           |      |       |
| participated         | 214 (80)                 | 9 (3)                          | 46 (17)    | 269 (100) | 21.01| 0.001 |
| Declined offer to    | 3 (25)                   | 1 (8)                          | 8 (67)     | 12 (100)  |      |       |
| participate          |                          |                                |            |           |      |       |
| Accepted but was     | 16 (84)                  | 0 (0)                          | 3 (16)     | 19 (100)  |      |       |
| ineligible           |                          |                                |            |           |      |       |
| **Total**            | 233 (78)                 | 10 (3)                         | 57 (19)    | 300 (100) |      |       |
| **Would participate in** |                      |                                |            |           |      |       |
| a CCT with a new drug |                          |                                |            |           |      |       |
| only tested on       |                          |                                |            |           |      |       |
| animals              | 641 (59)                 | 76 (7)                         | 336 (31)   | 1053 (97) |      |       |
| **Age group**        |                          |                                |            |           |      |       |
| ≤65 years            | 454 (66)                 | 29 (4)                         | 213 (31)   | 693 (100) | 42.83| <0.0001|
| >65 years            | 178 (52)                 | 49 (14)                        | 116 (34)   | 343 (100) |      |       |
| **Total**            | 632 (61)                 | 75 (7)                         | 329 (32)   | 1036 (100)|      |       |
| **Gender**           |                          |                                |            |           |      |       |
| Male                 | 251 (67)                 | 19 (5)                         | 102 (27)   | 372 (100) | 11.76| 0.003 |
| Female               | 385 (57)                 | 57 (8)                         | 233 (35)   | 675 (100) |      |       |
| **Total**            | 636 (61)                 | 76 (7)                         | 335 (32)   | 1047 (100)|      |       |
| **Marital status**   |                          |                                |            |           |      |       |
| Married              | 471 (62)                 | 47 (6)                         | 236 (31)   | 754 (100) | 26.64| 0.001 |
| Separate/divorced   | 44 (59)                  | 2 (3)                          | 29 (39)    | 75 (100)  |      |       |
| Single               | 79 (63)                  | 9 (7)                          | 37 (30)    | 125 (100) |      |       |
| Widowed              | 44 (47)                  | 18 (19)                        | 32 (34)    | 94 (100)  |      |       |
| **Total**            | 638 (61)                 | 76 (7)                         | 334 (32)   | 1048 (100)|      |       |
| **Uptake of CCT**    |                          |                                |            |           |      |       |
| Accepted offer and   |                          |                                |            |           |      |       |
| participated         | 188 (70)                 | 7 (3)                          | 74 (27)    | 269 (100) | 13.48| 0.023 |
| Declined offer to    | 5 (42)                   | 2 (17)                         | 5 (42)     | 12 (100)  |      |       |
| participate          |                          |                                |            |           |      |       |
| Accepted but was     | 17 (89)                  | 0 (0)                          | 2 (11)     | 19 (100)  |      |       |
| ineligible           |                          |                                |            |           |      |       |
| **Total**            | 210 (70)                 | 9 (3)                          | 81 (27)    | 300 (100) |      |       |
| **Would participate in** |                      |                                |            |           |      |       |
| translational trials |                          |                                |            |           |      |       |
| **Age group**        |                          |                                |            |           |      |       |
| ≤65 years            | 529 (76)                 | 21 (3)                         | 143 (21)   | 693 (100) | 20.71| <0.0001|
| >65 years            | 221 (65)                 | 27 (8)                         | 94 (27)    | 342 (100) |      |       |
| **Total**            | 750 (72)                 | 48 (5)                         | 237 (23)   | 1035 (100)|      |       |
| **Gender**           |                          |                                |            |           |      |       |
| Male                 | 286 (77)                 | 15 (4)                         | 70 (19)    | 371 (100) | 7.48 | 0.024 |
| Female               | 467 (69)                 | 34 (5)                         | 174 (26)   | 675 (100) |      |       |
| **Total**            | 753 (72)                 | 49 (5)                         | 244 (23)   | 1046 (100)|      |       |
3.7. Trust in Supports (All Patients)

Using a scale from 0 to 10, with a score of 0 indicating no trust and a score of 10 indicating maximum trust, patients rated information sources. Oncologists and research nurse specialists scored highest, with mean scores of 9.4 and 9.0, respectively. GPs and patient information booklets scored 7.8 and 7.5, respectively. The internet and newspaper/magazine reports were the least trusted, with scores of 3.7 and 3.8, respectively.

4. Discussion

Based on availability and patient eligibility, CCTs are a treatment option for patients. Before a patient chooses to participate in a clinical trial, they must first know that this is an option and understand clinical research. The aim of awareness ensures that patients can ask their oncology teams about CCT options, and doing so will ‘normalize’ CCTs as part of treatment option discussions. Increasing understanding and awareness may therefore also increase accrual. This national study aimed to describe understanding and awareness in Irish oncology patients after a previous study of the Irish public identified concerns around knowledge and understanding of cancer clinical research. Dissatisfaction by the public with the Irish health service and support by the Irish public for Ireland to operate as a focal point for clinical research provides an opportunity for clinical trials if the barriers to participation can be addressed [15].

We found slightly more oncology patients understood the term ‘clinical trial’ than the Irish public and while understanding of clinical research was lower in younger age groups in the general population [15], we found the opposite in cancer patients with older patients having poorer levels of understanding. There was great variation in understanding of cancer clinical trial methodology. Demographic and socioeconomic disparities are known to occur in clinical trial participation, with much lower recruitment of elderly patients [9,17,18]. We found uncertainty and a lack of understanding was more prevalent in older age groups, those that were widowed and in those with fewer years of education. Concern regarding treatment side effects is also a frequently reported reason for non-participation in CCTs [15,19–21]. Contrary to other studies and findings from the Irish public study [19,21,22], we found that over two-thirds of oncology patients in the survey did not report fear of more side effects, harm or death as being negative factors in their decision making around CCT participation. Where fears were present, this was higher in younger rather than older age groups and in females.

Two-thirds of oncology patients in our study were not offered the option to take part in a CCT and only 5% of patients not offered a trial independently asked about CCT participation, a finding consistent with other studies [22,23]. This outlines the need for better CCT awareness by patients and more incorporation of CCT discussion by medical teams with patients when treatment options are being
discussed. Of those that took up the offer of a CCT, 79% participated and an additional 6% accepted but were not eligible, while only 3% declined the offer. Willingness to participate was positively influenced by prior participation. Logistical concerns are often cited as a barrier to participation [9], and 20–25% of patients in our study had some logistical concerns this was more prevalent in females than males.

Patients are known to struggle with the concepts of chance and randomisation, have uncertainty about the appropriateness of CCTs for serious illnesses, and consider CCTs as valid treatment options only when standard treatment has failed [20,24]. Our study concurred with these findings. We found that the number of patients having difficulty understanding these concepts were more prevalent in older age groups. Difficulty with the concept of randomisation is a recognised factor affecting accrual to CCTs [15,24–27].

Understanding and acceptability of clinical equipoise is important in determining whether patients consent to randomisation and accept the treatment allocation assigned to them [28]. In our study, 58% of patients and 60% of previous CCT participants had a “therapeutic misconception” [29], despite 87% of previous CCT participants reportedly understanding the trial explanation. This discrepancy underlines the importance of checking and ensuring patients knowledge and understanding of what they are being told. Consultations between patients and oncologists have highlighted failures to provide consistent sequences of information with rationale for randomising [30], and ensuring consistency in explanations of clinical trial methodology would address some of these discrepancies.

The pharmacy industry is the largest sponsor of clinical trials, mainly undertaken on unapproved drugs to support an application for marketing approval [9]. A principal barrier to CCT uptake expressed by the Irish public was participation in drug trials [15]. We found that almost two-thirds of oncology patients initially expressed a willingness to participate in drug clinical trials but previous CCT participants changed their decisions about taking part when reminded that the trial drug might be worse than the standard-of-care treatment. Females in the study showed slight indications of being more risk adverse and were less willing than males to participate in theoretical CCTs for new drugs and translational trials.

Most patients who had been offered CCT participation selected having an information booklet or patient navigator as aids that they would like to have to assist them in making their decision and 59% of patients preference was to have CCTs explained to them by their consultant. The patient’s family can have a significant influence on their decision-making process, with 84% of patients that reported using support relying on their family to assist them in making decisions about CCT participation. However, some studies have shown that targeted awareness campaigns focusing on newly diagnosed patients and their families have not shown any significant increases in trial enrolment [9].

The hope of a personally improved outcome and altruistic reasons such as helping to fight cancer are commonly cited reasons for CCT participation [22–24]. The most frequent reasons given in our study for positively considering CCT participation was to feel better and live longer. We also found that Irish oncology patients, like patients elsewhere, wanted to participate in clinical trials to advance cancer research [9].

Only 14% of patients indicated that they would feel too weak to participate in CCTs. Our study population had a slightly higher median EQ VAS score of 75 compared to other studies of cancer patients [31–33]. We also found that of the 38% of participants reported as having some level of anxiety/depression, this was more prevalent in younger age groups and in female patients.

Many of the barriers to CCT participation that we found in our study of Irish oncology patients are already known. We did, however, find lower levels of commonly cited reasons to decline involvement in CCTs such as fear of side effects. The lower levels of fear were contrary to what was expressed in the general population and may be indicative of patients having a better awareness of cancer treatment side effects. We also found that only a small proportion of patients asked about clinical trials, indicative of a lack of awareness and highlighting a much broader issue around patient–clinician communication. Many patients are at a disadvantage compared to clinical staff in not knowing about clinical trials availability and understanding the associated concepts and methodology and depend on
their advice. Our principal finding was that elderly patients had consistently, across the variables tested, significantly less understanding of CCTs and would benefit from support. A lack of understanding of therapeutic trial methodology in the Irish population is likely to be a real barrier to uptake for these clinical trials and would no doubt benefit from a national communication campaign to raise awareness in this area.

There are several limitations to our study. The national accrual rate to CCTs is between 3 and 5%. Almost one-third of our study cohort reported being on a CCT, indicating selection bias in our sample. It is likely that CCT participants’ answers reflect real-life decisions that they made about participation. Patients often express a theoretical willingness/agreement to participate in hypothetical CCT scenarios and the study could not capture their actual decision in a real situation, and it is also possible that some patients gave socially desirable responses [24]. It is possible that despite provision of information, some patients may have confused being involved in a translational study with being on a CCT. We accept that missing data will also represent a source of bias. However, it is unlikely to affect the results due to random distribution across the variables. We excluded missing values when testing for associations.

5. Conclusions

Irish oncology patients understand the importance of cancer clinical research and having CCT options available to them. However, considerable misunderstanding regarding clinical equipoise and uncertainty around decision making was an issue, particularly in older patients. The global underrepresentation of older patients in clinical trials has not only been a health care disparity but has likely left this population with reduced understanding and awareness of clinical trials. Cancer incidence and mortality are growing worldwide, reflecting both an aging and rapidly growing global population. Advancing age is a known risk factor for cancer and it is imperative that older patients are represented in cancer clinical research and that awareness of clinical trials is raised in this population globally. Historically, clinical trials have been biased towards younger age groups.

Unlike in other studies, we found Irish cancer patients had less concerns around known fears of barriers to CCT participation such as fear of more side-effects, harm or death. They also expressed high levels of trust in oncology clinicians and nurses yet had reservations about participating in therapeutic trials. A qualitative study to better understand the reasons for this would be beneficial. Patient willingness to participate in therapeutic trials could be positively influenced by more awareness around CCT methodology. We found that younger females were slightly more risk adverse when considering new drug trial scenarios, possibly influenced by their higher levels of anxiety. Recognising and addressing these concerns may reduce anxiety and improve willingness to participate in CCTs. Improvement in information delivery on CCT concepts is warranted and tailoring communication of CCT information would be beneficial, particularly for the groups highlighted in the study that had lower levels of understanding. Patients in the study indicated that having a patient navigator would be a useful aid and consideration of the use of trained facilitators to support communication of the importance of clinical research may be advantageous.

This is the first nationwide study of oncology patients’ attitudes and understanding of cancer clinical trials in Ireland, and the findings can contribute towards considered interventions for improvement to help optimize accrual rates.

Author Contributions: Conceptualisation, data curation and methodology, C.M.K. (Catherine M. Kelly), R.F., J.M.C., M.H., M.S., S.O., A.M.H., J.W., R.M., P.G.M., M.K., M.M., C.M., K.D., A.M., J.A., V.M., D.M.O., C.M.K. (Ciara M. Kelly) and C.K. Investigation, C.M.K. (Catherine M. Kelly) and R.F. Formal analysis, C.K. and C.M.K. (Catherine M. Kelly). Writing—original draft preparation, C.K., C.M.K. (Catherine M. Kelly) and C.K. (Ciara M. Kelly). Writing—review and editing, C.K., R.F., J.M.C., M.H., M.S., S.O., A.M.H., J.W., R.M., P.G.M., M.K., M.M., C.M., K.D., A.M., J.A., V.M., D.M.O., W.M.G., C.M.K. (Ciara M. Kelly) and C.M.K. (Catherine M. Kelly). Supervision, C.M.K. (Catherine M. Kelly) and W.M.G. Project administration, C.M.K. (Catherine M. Kelly) and C.K. All authors have read and agreed to the published version of the manuscript.
**Funding:** This research was supported by educational grants awarded to us by Abbvie, Inveva, Bayer, Novartis and Amgen and funding from the European Union’s Horizon 2020 Research and innovation Programme under the Marie Skłodowska-Curie Co-funding of regional, national and international programmes [713279 to C.Kearns].

**Acknowledgments:** We would like to thank all the study participants and research staff at the cancer centres. This publication has been supported by TACTIC—TAiloring the Communication of risk To Individual breast Cancer patients, Irish Research Council (IRC) grant CLNE/2018/1338, CAROLINE Postdoctoral Fellowship. We would also like to acknowledge support given by research grants from Science Foundation Ireland (SFI) under Grant Nos. 15/IA/3104 and 18/SFP/3522.

**Conflicts of Interest:** The authors declare no conflict of interest.

**References**

1. Stensland, K.D.; McBride, R.B.; Latif, A.; Wisnivesky, J.; Hendricks, R.; Roper, N.; Boffetta, P.; Hall, S.J.; Oh, W.K.; Galsky, M. Adult Cancer Clinical Trials That Fail to Complete: An Epidemic? *J. Natl. Cancer Inst.* 2014, 106. [CrossRef]  
2. National Cancer Strategy 2017–2026. 2017. Available online: [https://www.gov.ie/en/publication/a89819-national-cancer-strategy-2017-2026/](https://www.gov.ie/en/publication/a89819-national-cancer-strategy-2017-2026/) (accessed on 10 July 2019).  
3. Irish Cancer Society Clinical Trials Information. Available online: [https://www.Cancer.Ie/Cancer-Information/Treatments/Clinical-Trials](https://www.Cancer.Ie/Cancer-Information/Treatments/Clinical-Trials) (accessed on 4 June 2019).  
4. National Cancer Institute ‘What Are Clinical Trials’ Information Page. Available online: [https://www.National-Cancer-Institute.Gov/About-Cancer/Treatment/Clinical-Trials/What-Are-Trials](https://www.National-Cancer-Institute.Gov/About-Cancer/Treatment/Clinical-Trials/What-Are-Trials) (accessed on 4 June 2019).  
5. ASCO Clinical Trials Information Page. Available online: [https://www.AscO.Org/Research-Progress/Clinical-Trials](https://www.AscO.Org/Research-Progress/Clinical-Trials) (accessed on 4 June 2019).  
6. Denicoff, A.M.; McCaskill-Stevens, W.; Grubbs, S.S.; Bruinooge, S.S.; Comis, R.L.; Devine, P.; Dilts, D.M.; Duff, M.E.; Ford, J.G.; Joffe, S.; et al. The National Cancer Institute–American Society of Clinical Oncology Cancer Trial Accrual Symposium: Summary and Recommendations. *J. Oncol. Pract.* 2013, 9, 267–276. [CrossRef]  
7. James, P.; Bebee, P.; Beekman, L.; Browning, D.; Innes, M.; Kain, J.; Royce-Westcott, T.; Waldinger, M. Effort tracking metrics provide data for optimal budgeting and workload management in therapeutic cancer clinical trials. *J. Natl. Compr. Cancer Netw.* 2011, 9, 1343–1352. [CrossRef] [PubMed]  
8. Meropol, N.J.; Buzaglo, J.S.; Millard, J.; Damjanov, N.; Miller, S.M.; Ridgway, C.; Ross, E.A.; Sprandio, J.D.; Watts, P. Barriers to clinical trial participation as perceived by oncologists and patients. *J. Natl. Compr. Cancer Netw.* 2007, 5, 753–762. [CrossRef] [PubMed]  
9. Barriers to Patient Enrolment in Therapeutic Clinical Trials for Cancer—A Landscape Report. 2018. Available online: [https://www.fightcancer.org/policy-resources/clinical-trial-barriers](https://www.fightcancer.org/policy-resources/clinical-trial-barriers) (accessed on 30 July 2019).  
10. Murthy, V.H.; Krumholz, H.M.; Gross, C.P. Participation in Cancer Clinical Trials. *JAMA* 2004, 291, 2720–2726. [CrossRef] [PubMed]  
11. Lewis, J.H.; Kilgore, M.L.; Goldman, D.P.; Trimble, E.L.; Kaplan, R.; Montello, M.J.; Housman, M.G.; Escaic, J.J. Participation of Patients 65 Years of Age or Older in Cancer Clinical Trials. *J. Clin. Oncol.* 2003, 21, 1383–1389. [CrossRef] [PubMed]  
12. Talarico, L.; Chen, G.; Pazdur, R. Enrollment of Elderly Patients in Clinical Trials for Cancer Drug Registration: A 7-Year Experience by the US Food and Drug Administration. *J. Clin. Oncol.* 2004, 22, 4626–4631. [CrossRef]  
13. Unger, J.M.; Coltman, C.A.; Crowley, J.J.; Hutchins, L.E.; Martino, S.; Livingstone, R.B.; Macdonald, J.S.; Blanke, C.D.; Gandara, D.R.; Crawford, E.D.; et al. Impact of the Year 2000 Medicare Policy Change on Older Patient Enrollment to Cancer Clinical Trials. *J. Clin. Oncol.* 2006, 24, 141–144. [CrossRef]  
14. National Institutes of Health. Revision: NIH Policy and Guidelines on the Inclusion of Individuals Across the Lifespan as Participants in Research Involving Human Subjects. NOT OD 18 116. Available online: [https://grants.nih.gov/grants/guide/notice-files/NOT-OD-18-116.html](https://grants.nih.gov/grants/guide/notice-files/NOT-OD-18-116.html) (accessed on 13 March 2018).  
15. Ipposi. Report Into The General Public’s Attitude’s Towards Clinical Research. 2009. Available online: [https://www.ipposi.ie/our-work/publications/public-attitudes/](https://www.ipposi.ie/our-work/publications/public-attitudes/) (accessed on 2 August 2018).  
16. Smith, M.; Flynn, S.; Reyes, A.; Higgins, M.; McCaffrey, J.; Kelly, C. Accrual to Cancer Clinical Trial. *Ir. Med. J.* 2016, 109, 436.
17. Hamel, L.M.; Penner, L.A.; Albrecht, T.L.; Heath, E.; Gwede, C.K.; Eggly, S. Barriers to Clinical Trial Enrollment in Racial and Ethnic Minority Patients with Cancer. *Cancer Control* 2016, 23, 327–337. [CrossRef]

18. Stewart, J.H.; Bertoni, A.G.; Staten, J.L.; Levine, E.A.; Gross, C.P. Participation in Surgical Oncology Clinical Trials: Gender-, Race/Ethnicity-, and Age-based Disparities. *Ann. Surg. Oncol.* 2007, 14, 3328–3334. [CrossRef] [PubMed]

19. Weckstein, D.J.; Thomas, C.A.; Emery, I.F.; Shea, B.F.; Fleury, A.; White, M.E.; Chase, E.; Robinson, C.; Frazier, S.; Pilar, C. Assessment of Perceived Cost to the Patient and Other Barriers to Clinical Trial Participation. *J. Oncol. Pract.* 2011, 7, 330–333. [CrossRef] [PubMed]

20. Mills, E.J.; Seely, D.; Rachlis, B.; Griffith, L.; Wu, P.; Wilson, K.; Ellis, P.; Wright, J. Barriers to participation in clinical trials of cancer: A meta-analysis and systematic review of patient-reported factors. *Lancet Oncol.* 2006, 7, 141–148. [CrossRef]

21. Brown, R.F.; Cadet, D.L.; Houlihan, R.H.; Thomson, M.; Pratt, E.C.; Sullivan, A.; Siminoff, L.A. Perceptions of Participation in a Phase I, II, or III Clinical Trial Among African American Patients With Cancer: What Do Refusers Say? *J. Oncol. Pract.* 2013, 9, 287–293. [CrossRef]

22. Comis, R.L.; Miller, J.D.; Aldigé, C.R.; Krebs, L.; Stoval, E. Public Attitudes Toward Participation in Cancer Clinical Trials. *J. Clin. Oncol.* 2003, 21, 830–835. [CrossRef] [PubMed]

23. Jenkins, V.; Fallowfield, L. Reasons for accepting or declining to participate in randomized clinical trials for cancer therapy. *Br. J. Cancer* 2000, 82, 1783–1788. [CrossRef] [PubMed]

24. Adams-Campbell, L.L.; Ahaghotu, C.; Gaskins, M.; Dawkins, F.W.; Smoot, D.; Polk, O.D.; Gooding, R.; DeWitty, R.L. Enrollment of African Americans Onto Clinical Treatment Trials: Study Design Barriers. *J. Clin. Oncol.* 2004, 22, 730–734. [CrossRef]

25. Avis, N.E.; Smith, K.W.; Link, C.L.; Hortobagyi, G.N.; Rivera, E. Factors Associated With Participation in Breast Cancer Treatment Clinical Trials. *J. Clin. Oncol.* 2006, 24, 1860–1867. [CrossRef] [PubMed]

26. Appelbaum, P.S.; Butow, P.; Ellis, P.; Boyle, F.; Tattersall, M. Seeking informed consent to cancer clinical trials. *Soc. Sci. Med.* 2004, 58, 2445–2457. [CrossRef] [PubMed]

27. Luo, N.; Johnson, J.A.; Dowling, J.W.; Feeny, D.; Coons, S.J. Self-Reported Health Status of the General Adult U.S. Population as Assessed by the EQ-5D and Health Utilities Index. *Med. Care* 2005, 43, 1078–1086. [CrossRef] [PubMed]