

# Scale Development/Adaptation Studies Conducted within the Scope of Cyber Threats and Information Security Issues

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**Abstract-** In this study, it was aimed to review nationally and internationally published articles on issues such as “cyber threats, information security, adverse cyber behavior, cyber-human values and their sub-domains” between 2010 and 2018. A one-shot survey model, one of the general survey models, was utilized. Within the scope of the study, all scale development and adaptation articles in the relevant field that were indexed in the Web of Science and TR Index between 2010 and 2018 and that were accessible full-text constituted the research population of the study. As a result of the study, it was seen that the number of scale studies carried out nationally was quantitatively twice as many as the number of those carried out internationally. In international publications, based on the reviews, it was observed that there were more publications in science journals, especially in engineering journals. According to the distribution of subjects, the most studied subject of the field in all publications was “adverse cyber behaviors.” This was followed by the “information security” topics. The least addressed subjects were “cyber-human values.” All the findings obtained in the other subjects investigated in this study are presented in the discussion and conclusion sections.

**Keywords-** Information security, Cyber security, Awareness, Perception, Risk

## 1. Introduction

The basic reason behind scientific studies is to collect valid and reliable information. The primary method of gathering scientific information is the process of measurement. Tosun and Taşkesenligil [1] have stated that valid and reliable measurement instruments are some of the cornerstones of scientific research. In other words, the process of measurement is often utilized to measure different abilities, perceptions and attitudes of individuals in research studies; to make certain decisions based on them; and to explain the relationships between different structures [2]. In this sense, researchers

need measurement instruments in their studies, even if they work in different fields [3].

Scales as measurement instruments allow measuring variables that are considered to exist but cannot be observed directly [4-6]. Scales consist of items that aim to reveal the levels of such variables. The most commonly used method for measurement activities that can be carried out in any field is to have an individual to take a test, and to score the reactions of the individual to the items in the test according to a certain method [7]. In other words, measurement is the numerical determination of the degree to which individuals and entities have certain qualities or characteristics [8]. According to Cronbach [9], these tests are tools used to

systematically compare the behavior of two or more individuals.

For a scale to be accepted by the scientific community, it is necessary that it is developed or adapted in accordance with certain standards [10]. At this point, the scale preparation process can be carried out in two ways. One of them is to develop a scale that is unique to our own culture, and another is to adapt a scale developed in different cultures to Turkish [11]. Researchers who wish to develop or adapt a scale must be familiar with the structure of the variable they are trying to measure and the theoretical structure with which this variable is associated [12].

If there is any doubt about the measurements of a variable, the results obtained from the relationship and difference tests examined based on the doubtful measurements will be doubtful as well as the interpretations that are made based on them [13]. In other words, the same scales or similar scales developed to measure the same property may produce inconsistent results, so the nature of such instruments used to measure variables that cannot be directly observed is very important [6]. A significant consideration is how to interpret the results such as selecting the appropriate scale type from among various scale types and determining the options of response when deciding to use a measurement instrument [4].

The applications that have entered our lives together with information technologies have made great positive contributions to life, but brought with them certain issues, such as cyber threats and information security. In recent years, the interest in cyber threats and information security has demonstrated a huge increase in our country as well as in the world, and paralleling that, research conducted in our country in this field has also increased [14].

National and international studies, similar to ours, involving scale development and scale adaptation studies that have been examined according to various variables are given below:

➤ Hinkin [15] studied 75 articles published in leading academic journals between 1989 and 1994 and the 277 measurement instruments used, in terms of scale development steps.

- Worthington & Whittaker [16] have carried out content analysis on scale development articles published in the Journal of Counseling Psychology between 1995 and 2004.
- Slavec & Drnovsek [17] examined the studies published in journals of entrepreneurship between 2009 and 2010 in terms of scale development steps.
- Çüm & Koç [18] examined the 29 scale development articles published between 2005 and 2013 in terms of scale development steps.
- Tavşancıl et al. [19] examined 54 attitudes scale development studies in the fields of education and psychology in Turkey between 2002 and 2012 in terms of the scale development process.
- Mor Dirlik [3] examined 5 theses completed in the field of educational sciences between 2009 and 2014 in terms of the extent to which the scale development standards were met.
- Acar Güvendir & Özer Özkan [11] examined 26 scale development articles conducted in the field of education in Turkey between 2006 and 2014 and indexed in SSCI, in terms of the steps followed during the process.
- Delice & Ergene [20] examined 35 scale development and 18 scale adaptation studies published in the field of mathematics education between 2005 and 2014 in terms of scale development and adaptation steps.
- Gül & Sözbilir [21] examined 22 scale development articles published between 2000 and 2013 in the field of science and mathematics education in Turkey in terms of content and methodological instruments.
- Tosun & Taşkesenligil [1] conducted a document analysis of a total of 62 articles consisting of developed/adapted scales/achievement tests published in national journals in the field of science education between 2002 and 2013.
- Kaya Uyanık et al. [6] examined 57 scale development articles conducted in the field of education in Turkey between 2010 and 2015, which were indexed in the Social Sciences Citation Index (SSCI), in terms of the scale development steps.

➤ Şahin & Boztunç Öztürk [22] examined 72 scale development articles published in the field of education in Turkey between 2010 and 2016, in terms of the scale development steps.

Apart from these studies, the studies that were found were mostly focused on a single journal, examined a limited number of subjects and statistical techniques, and had findings that were mostly interpreted with quantitative techniques [21].

In this study, it was aimed to review nationally and internationally published articles on issues such as “cyber threats, information security, adverse cyber behaviour, cyber-human values and their sub-domains” between 2010 and 2018. This study is important as it draws attention to the issue and contribute to new research in the field.

## 2. Method

In this study, an attempt was made to examine the existing situation, and the one-shot survey model was utilized, being one of the general survey models. Survey models are research approaches aimed at describing as it is a situation that exists in the past or that is still present [23]. General survey models are the survey models that are carried out on the whole population or a group, example or sample to be taken from that whole in order to reach a general judgment about the population consisting of many elements [24]. In this kind of approach, an attempt is made to individually identify the variables belonging to a unit or a situation such as an event, item, individual, group, and subject that are the points of interest [25]. Information from the scales was gathered using the survey information form developed by the researchers, and this information was examined using the SPSS software package program.

### 2.1. Sample

The journals indexed in the TR Index and the Web of Science Index constituted the population of the study, within the scope of the study. Theses

prepared in the field were also included in the study through the National Thesis Center. All of the 66 articles, which were obtained by reviewing the indices and were suitable for our purposes, constituted the sample of the study.

This study is limited to the articles, which were deemed suitable for the study based on the assessment of all studies conducted between 2010 and 2018, obtained through the review of the aforesaid directory systems, by using the keywords including cyber threats, information security, adverse cyber behaviour, cyber-human values and their sub-domains.

## 3. Results

There were 41 publications origination from the TR Index, and they constituted 62% of all publications, which corresponded to a great majority. The number of international publications originating from the Web of Science was 22, and 3 theses were also present in the study (Table 1).

TABLE 1: Distribution of studies by indices

| Categories             | f  | %     |
|------------------------|----|-------|
| TR Index               | 41 | 62.1  |
| Web of Science         | 22 | 33.3  |
| National Thesis Center | 3  | 4.5   |
| Total                  | 66 | 100.0 |

The maximum number of studies involving the subjects related to the field was in 2015. There were 19 such articles. A high rate, 29%, was observed compared to the studies in all years. It is seen that the expectations about the subject were high in this year, and the studies could not reach this level again. After the decline in number of studies in 2016, there was a tendency in the number of studies to increase in 2017. It is seen that the number of studies declined again in 2018 (Table 2).

A high percent (83%) of the scales examined were a new scale development study. Other than these, the remaining 17% of them were an adaptation of an existing scale to a different culture or environment (Table 3).

**TABLE 2: Distribution of studies by years**

| Categories | f  | %     |
|------------|----|-------|
| 2010       | 2  | 3.0   |
| 2012       | 2  | 3.0   |
| 2013       | 6  | 9.1   |
| 2014       | 3  | 4.5   |
| 2015       | 19 | 28.8  |
| 2016       | 10 | 15.2  |
| 2017       | 18 | 27.3  |
| 2018       | 6  | 9.1   |
| Total      | 66 | 100.0 |

**TABLE 3: Distribution of scales by types**

| Categories        | f  | %     |
|-------------------|----|-------|
| Scale Development | 55 | 83.3  |
| Scale Adaptation  | 11 | 16.7  |
| Total             | 66 | 100.0 |

“Adverse cyber behaviours” was the most studied subject content in all publications. This was followed by “information security” topics. The least addressed subjects were “cyber humanitarian values” (Table 4).

**TABLE 4: Distribution of studies by indices**

| Categories               | f  | %     |
|--------------------------|----|-------|
| Adverse Cyber Behaviours | 35 | 53.0  |
| Information Security     | 22 | 33.3  |
| Cyber-Human Values       | 9  | 13.6  |
| Total                    | 66 | 100.0 |

It was seen that the greatest number of scale studies that were investigated was in the Gazi University Journal of Gazi Educational Faculty. There were 7 such publications (11%) in the journal. This place of publication was followed by the journal of Computers in Human Behavior with 5 such studies (8%). Apart from these, there were 4 places of publication with 3 studies, 5 places of publication with 2 studies, and 32 places of publication with 1 study. It was found that 66 scale studies were published in 43 separate places of

publication. In addition, when analyzed in general, only 7 of the 43 places of publication were science and engineering journals or interdisciplinary journals in these fields. The remaining journals were social sciences journals and especially education and psychology journals (Table 5).

**TABLE 5: Distribution of scales by places of publication**

| Categories  | f  | %     |
|---|----|-------|
| Gazi University Journal of Gazi Educational Faculty     | 7  | 10.6  |
| Computers in Human Behaviour                            | 5  | 7.6   |
| Kırşehir Journal of Faculty of Education                | 3  | 4.5   |
| Online Journal of Technology Addiction & Cyberbullying  | 3  | 4.5   |
| Sakarya University Journal of Education Faculty         | 3  | 4.5   |
| Thesis — PhD & Master’s                                 | 3  | 4.5   |
| Anatolian Journal of Psychiatry                         | 2  | 3.0   |
| Elementary Education Online                             | 2  | 3.0   |
| Kastamonu Education Journal                             | 2  | 3.0   |
| Journal of National Education                           | 2  | 3.0   |
| Procedia Social and Behavioral Sciences                 | 2  | 3.0   |
| Other (32 places of publication with only 1 study each) | 32 | 48.8  |
| Total   | 66 | 100.0 |

The aim of the scale was stated in 65 (98.5%) of all publications. It was seen that the aim was not specified in only 1 study (Table 6).

**TABLE 6: Was the purpose of the scale study specified?**

| Categories         | f  | %     |
|--------------------|----|-------|
| Yes                | 65 | 98.5  |
| No / Not specified | 1  | 1.5   |
| Total              | 66 | 100.0 |

The theoretical foundations of the scale and the subjects were described in the contents of 53 scale studies that were examined. This situation corresponded to 80% of all studies. In addition, the theoretical foundations of the scales were not presented in 13 studies (20%) (Table 7).

**TABLE 7: Were the theoretical foundations of the scale explained?**

| Categories         | f  | %     |
|--------------------|----|-------|
| Yes                | 53 | 80.3  |
| No / Not specified | 13 | 19.7  |
| Total              | 66 | 100.0 |

In only 18 of all publications (28% — a low rate), the study included the description and the manual of the scale, while in 48 of them (73%), the description and the manual were not presented (Table 8).

**TABLE 8: Was there a description and the manual of the scale?**

| Categories         | f  | %     |
|--------------------|----|-------|
| Yes                | 18 | 27.3  |
| No / Not specified | 48 | 72.7  |
| Total              | 66 | 100.0 |

There was information on the creation of an item pool in 52 of the scale studies, in other words, in 79%. In 14 studies, or in 21% of the studies, no information was provided about this subject (Table 9).

**TABLE 9: Was an item pool created?**

| Categories         | f  | %     |
|--------------------|----|-------|
| Yes                | 52 | 78.8  |
| No / Not specified | 14 | 21.2  |
| Total              | 66 | 100.0 |

It was seen that the most frequently preferred number of items was 17 in 6 different studies (9%) among the scale studies that were examined. Secondly, 5 studies had 11 items (8%). Moreover, it was found that the maximum number of items was 51, the minimum number of items was 4, and the average number of items of all studies was 22 (Table 10).

**TABLE 10: Number of items on the scale**

| Categories (Number of items on the scale) | f    | %     | Valid % |
|---|------|-------|---------|
| 17  | 6    | 9.1   | 9.4     |
| 11  | 5    | 7.6   | 7.8     |
| 14  | 4    | 6.1   | 6.3     |
| 24  | 4    | 6.1   | 6.3     |
| 25  | 3    | 4.5   | 4.7     |
| 26  | 3    | 4.5   | 4.7     |
| Other (2 or fewer items)                  | 39   | 59.1  | 60.8    |
| Missing data (unspecified)                | 2    | 3     | -       |
| Total                                     | 66   | 100.0 | 100.0   |
| Average number of items                   | 22.2 |       |         |

There was information on the conduct of pilot studies in 52 of all studies, in other words, in 79%. In 14 studies, or in 21% of the studies, no information was provided about this subject (Table 11).

**TABLE 11: Were pilot studies conducted?**

| Categories         | f  | %     |
|--------------------|----|-------|
| Yes                | 52 | 78.8  |
| No / Not specified | 14 | 21.2  |
| Total              | 66 | 100.0 |

It was seen that the most common number of people in the sample was 528 in 7 different studies (11%) among the scale studies that were examined. Apart from this, two studies had 6 people in their samples, and in 46 studies, the sample numbers were not applied in any other study except for the number itself. In 1 study, there was information on the number of people in the sample. Moreover, it was found that the maximum number of people in the sample was 3026, the minimum number of people was 43, and the average number of people in the samples of all studies was 662 (Table 12).

There were 41 publications with students in their samples, and they constituted 62% of all publications, which corresponded to a great majority. The number of publications with adults in their samples was 18, and it was 28% of all studies. Finally, in 6 publications, in other words, in 9% of all publications, the people in the sample were

determined as teachers or faculty members (Table 13).

**TABLE 12: Number of people in the sample**

| Categories (Number of people in the sample of the scale) | f     | %     | Valid % |
|--|-------|-------|---------|
| 528  | 7     | 10.6  | 10.8    |
| 607  | 2     | 3     | 3.1     |
| 633  | 2     | 3     | 3.1     |
| 788  | 2     | 3     | 3.1     |
| 935  | 2     | 3     | 3.1     |
| 1078   | 2     | 3     | 3.1     |
| 1097   | 2     | 3     | 3.1     |
| Other*   | 46    | 69.9  | 70.6    |
| Missing data (unspecified)                               | 1     | 1.5   | -       |
| Total  | 66    | 100.0 | 100.0   |
| Average number of people in the sample                   | 662.2 |       |         |

\* the number of people in the sample that were implemented once

**TABLE 13: Type of people in the sample**

| Categories               | f  | %     |
|--------------------------|----|-------|
| Student                  | 41 | 62.1  |
| Adult                    | 18 | 27.3  |
| Teacher / Faculty Member | 6  | 9.1   |
| Unspecified              | 1  | 1.5   |
| Total                    | 66 | 100.0 |

It was specified in 53 of all publications (80% a high rate), expert opinion was obtained in the scale study, while in 13 of them (20%) there was no information on whether expert opinion was sought (Table 14).

**TABLE 14: Was expert opinion taken in the scale study?**

| Categories         | f  | %     |
|--------------------|----|-------|
| Yes                | 53 | 80.3  |
| No / Not specified | 13 | 19.7  |
| Total              | 66 | 100.0 |

Information about the number of experts was given in 42 studies. It was seen that the most

common number of experts was 16 in 9 different studies (21%) among these scale studies. In 6 scale studies (14%), there were 5 experts involved in the study. Thirdly, in 5 scale studies (12%), there were 6 experts involved in the study. Apart from these, it was seen that the number of experts in 4 studies was 3, and the number of experts in 3 studies was 7. In 15 studies, there were 2 or fewer experts. Moreover, in 24 studies, there was no information on the number of experts involved in the implementation. Finally, regarding the number of experts consulted, it was seen that the maximum and the minimum numbers of experts consulted for a single study were 43, and 2, respectively. The average number of experts involved in the implementation of all studies was determined to be 10 (Table 15).

**TABLE 15: Number of experts involved in the scale study**

| Categories (Numbers of Experts)        | f    | %     | Valid % |
|--|------|-------|---------|
| 16                                     | 9    | 13.6  | 21.4    |
| 5                                      | 6    | 9.1   | 14.3    |
| 6                                      | 5    | 7.6   | 11.9    |
| 3                                      | 4    | 6.1   | 9.5     |
| 7                                      | 3    | 4.5   | 7.1     |
| Other (2 or fewer experts)             | 15   | 22.7  | 35.8    |
| Missing data (unspecified)             | 24   | 36.4  | -       |
| Total                                  | 66   | 100.0 | 100.0   |
| Average number of people in the sample | 10.1 |       |         |

There was information on the conduct of validity and reliability studies of the scale in 64 of all studies, in other words, in 79%. In only 2 studies, or proportionally in 3% of all studies, no information was provided about this issue (Table 16).

**TABLE 16: Were the validity and reliability of the scale checked?**

| Categories         | f  | %     |
|--------------------|----|-------|
| Yes                | 64 | 97.0  |
| No / Not specified | 2  | 3.0   |
| Total              | 66 | 100.0 |

In 47 of all publications (71% — a high rate), information about other similar studies was given in the scale study. In 19 of the publications, or proportionally in 29% of all publications, no information was provided about other similar studies (Table 17).

TABLE 17: Was information given about other similar studies, if any?

| Categories         | f  | %     |
|--------------------|----|-------|
| Yes                | 47 | 71.2  |
| No / Not specified | 19 | 28.8  |
| Total              | 66 | 100.0 |

#### 4. Discussion

Within the scope of this study, all of the articles about scale development and adaptation indexed in the Web of Science and TR Index between 2010 and 2018 in the relevant fields were investigated using the survey information forms developed by the researchers. Before proceeding with the discussion of our findings and the association of them with the literature, it should be noted that all the findings produced from the studies examined were obtained from the information reported in articles by the researchers of the scales that were examined.

As a result of the study, there was a statistically significant difference between the numbers of international and national scale development and adaptation studies in favor of national publications. In other words, in terms of quantity, national publications were found to be twice as many as international publications. In order to assess this issue more accurately, it is necessary to share information about the journals where the studies were published.

In terms of the places of publication of the studies, the scale studies were found to be most frequently published in the “Gazi University Journal of Gazi Educational Faculty,” followed by the “Computers in Human Behavior.” When the places of publication were examined in terms of the types of content, the social sciences journals and especially the educational and psychology journals were six times as many as the science and engineering journals or the interdisciplinary

journals in these fields. Important findings were obtained when the publications were grouped nationally and internationally. All the national publications were found to be in journals of social sciences and especially in journals of educational sciences, whereas international publications were mostly in science and engineering journals. It can be said that this situation stemmed from the tendency to use scales more in social research and as a result of supply–demand, it affected the number of scale studies in national publications. Supporting this information, Acar Güvendir & Özer Özkan [11] have indicated that many of the publications presented in the national congresses and published in journals in the recent years were related to scale development and adaptation. In addition, as a reason for the strong tendency to use scales, Erkuş [26] and Acar Güvendir & Özer Özkan [11] point to the pressure on academicians to publish. It has been stated that as a result of this pressure, many academicians from the field of measurement and evaluation or from near/distant fields have seen the scale development or scale adaptation work as the “easiest” way to publish. Such conditions cause erroneous and incomplete studies to arise, and ultimately, reduce the quality of studies.

In terms of the distribution of the publications to years, most studies were carried out in 2015, and in that year, a high rate was observed compared to that of the studies in all years. It is seen that the expectations about the subject were high in this year, and the studies could not reach this level again. After the decline in number of studies in 2016, there was a tendency in the number of studies to increase in 2017. It is seen that the number of studies declined again in 2018. In terms of the distribution of publications by years, the rapid developments among scientists, paralleling the technological developments, are thought to cause a rapid increase, decrease or balance in the number of publications. The Gartner Hype Cycle, which addresses the cycle of acceptance and use of new technologies, that is updated annually by Gartner is published to investigate emerging technologies, the points where the expectations from these technologies are at the highest level, the fall of expectations, and their stages of becoming a widespread technology [27]. From this viewpoint, it can be said that the distribution of the number of

publications by years was at the highest level in 2015. However, although there was a numerical decrease in the distribution in the past years, it can be said that the distribution tended to reach the productivity level.

There are two types of scale studies: involving the development of a new scale and involving the adaptation of an existing scale to a different culture or environment. There was a statistically significant difference between these two types, in favor of scale development. In terms of quantity, the scale development studies were found to be five times as many as the scale adaptation studies. In the literature, the study of Hambleton & Patsula [28] is noteworthy in terms of revealing the scale development was preferred more, unlike our findings. In the study of Hambleton & Patsula [28], issues such as the following were presented as the superiorities of scale adaptation: Scale adaptation is cheaper and faster than developing a new scale, and also the sense of confidence in a test accepted in the field is more than a new test to be developed.

For us to be able determine the type of a scale study, it was not clearly stated how the selection was made. It was not reported in almost all of the studies whether the study was a new scale development or an adaptation of an existing scale. The study findings of Çüm & Koç [18] and Delice & Ergene [20] are also in the same direction as our findings. It is seen as a significant deficiency that this decision was not stated in the stages of scientific discussion and conclusion [20]. This deficiency is indicative of the fact that the decision-making process for the determination of the type of the scale study was not given due importance. It was seen as another issue that permissions to adopt the scales were not reported in the studies either. According to Çüm & Koç [18], this is a significant ethical problem, and the researchers who adapt a scale should be more sensitive to this issue.

According to the distribution of subjects, the most studied subject of the field in all publications was “adverse cyber behaviors”. This was followed by “information security” topics. The least addressed subjects were “cyber humanitarian values.” These findings are important for the researchers of the field. Revealing the distribution of the subjects in the field that are studied gives interested researchers’ opportunities to plan ahead

and carry out assessments. It can be said that the conduct of studies in the field in a more conscious way in terms of subjects, in this sense, and gravitating towards the subjects that are studied less will contribute greatly to the field.

The purpose of the scale study was found to be reported in almost all publications. The purpose of the scale study was not specified in only one publication. In the literature, Çüm & Koç [18] also stated that all studies that they examined presented the purpose. Delice & Ergene [20] stated that the researchers expressed the purpose of their scale studies and that they had knowledge about this issue. In their review study, Şahin & Boztunç Öztürk [22] also indicated that the purpose of the measurement instrument was presented in all studies they examined. The results of these studies where they examined the scale development or adaptation processes have similarities with the results of our study. These findings show that researchers who develop or adapt scales give importance to clearly determining what purpose the scales to be prepared would be used for in advance.

The number of publications including a description of the theoretical foundations of subjects in the scale studies was found to be a significant majority. Moreover, it was seen that the number of publications where information about other similar studies was given was also a significant majority. Researchers such as Çüm & Koç [18], Delice & Ergene [20] and Şahin & Boztunç Öztürk [22] stated that the theoretical foundations of the structures measured in their studies were defined in the publications they examined. These statements also support the results of our study.

In a majority of the publications, it was found that the descriptions and the manuals of the scale were not included in the study. Delice & Ergene [20] have emphasized that the presentation of all definitions and descriptions of the variables to be measured in the study is necessary and important because it will affect the subsequent phases in the process. In the light of all these assessments, the lack of descriptions and manuals of scale studies can cause erroneous and incomplete operations especially during the implementation phases. In order to avoid these adverse situations, it can be

said that it will be important and useful that researchers pay attention to this issue.

In scale studies, it was seen that the number of publications with information on the creation of an item pool and implementation of pilot studies was an important majority. When other research studies in the field are examined with regard to this issue, it is seen that the formation of an item pool is something important in scale studies [11; 22]. In this case, the implications from research studies support our research results. Moreover, there are also studies that differ from our results that present contrasting results. In the first of these studies, in the majority of the scale development and adaptation studies carried out by Delice & Ergene [20], it was stated that no information was presented about a pilot study. In another, it was stated that a pilot study was conducted on a small group in very few of the scale studies examined in the research conducted by Çüm & Koç [18]. It can be said that conducting pilot studies in scale studies primarily ensures the correct understanding of the scale in terms of usability, ease of implementation, and correction of deficiencies and errors. It can also be said that these studies are very important in terms of increasing the reliability and validity of the scale.

There was no significant difference between the studies in terms of the number of items and the number of people in the sample. In the scale studies, it was found that the maximum number of items was 51, the minimum number of items was 4, and the average number of items of all studies was 22. Moreover, it was found that the maximum number of people in the sample was 3026, the minimum number of people was 43, and the average number of people in the samples of all studies was 662. When the studies on this subject in the field were examined, first, Aleamoni [29] stated that the number of people in a sample should be at least 400 in his study. Comrey & Lee [30] have judged, in their study, the samples consisting of 100, 200, 300, 500 and 1000 people as poor, moderate, good and excellent, respectively. Gül & Sözbilir [21] have stated that the numbers of people in samples are usually between 301 and 500, and further increasing the number of people in a sample is necessary in order to achieve more positive and more reliable results in terms of validity and reliability. In their study of review of scales, Şahin

& Boztunç Öztürk [22] stated that the number of people in more than half of all the studies was 300 or more. In addition to this, it was seen that the number of participants per scale item frequently ranged from 5.00 to 9.99. So far, findings of studies have been similar to our findings. In the study conducted by Tosun & Taşkesenligil [1], it was expressed that the number of people in the samples was between 101 and 200 in general. This study finding was found to differ from the results of our study.

There is also a false understanding that increasing the number of people in a sample will always bear fruit in terms of reliability. In this regard, Gül & Sözbilir [21] have stated that the accuracy of a sample and how seriousness the form of the scale is filled are also very important, as well as the number of people in the sample.

It is seen that students constituted a majority of the target audience of the publications. The studies on students were followed by the studies on adults as the target audience. The studies targeting teachers or faculty members were found to be very few. Studies on this subject in the field were examined. Gül & Sözbilir [21] revealed that the target audience in the scale studies that they examined was mostly secondary education and undergraduate education students. It is seen that in the study carried out by Tosun & Taşkesenligil [1], the target audience, similarly, was undergraduate and secondary school students. It can be argued that samples consisting of students were preferred more due to a number of conveniences, such as easily reaching the target audience, easy implementation and suitability for participation.

A significant majority of publications have been determined to have expert opinion during the stages of scale development. Regarding the number of experts consulted, it was seen that the maximum and the minimum numbers of experts consulted for a single study were 43, and 2, respectively. The average number of experts involved in the implementation of all studies was determined to be 10. Çüm & Koç [18] have expressed that expert opinion was sought in the vast majority of the studies they have examined. It is seen in the study of Acar Güvendir & Özer Özkan [11] that almost all of the scale development articles involved expert opinion. In a small number of scale

adaptation articles, expert opinion was not sought, and the tendency to not seek expert opinion was higher. Şahin & Boztunç Öztürk [22] stated that expert opinion was sought in almost all of the articles they examined. The results of these studies, which were carried out in the field, have similarities with our research results.

It was found that the validity and reliability of the scale were tested in almost all of the publications. There was no information about this subject in only two publications. In this regard, when studies in the field are examined, first, Delice & Ergene [20] stated that the validity and reliability coefficients were reported in the vast majority of studies. As another study, Gül & Sözbilir [21] stated in their review study that information about reliability analyses was reported in all of the articles. So far, findings of studies have been similar to our findings. Çüm & Koç [18] demonstrated that information on item and scale analyses was not reported in many scale development articles. This study finding was found to differ from the results of our study. It can be said that, in general, validity and reliability studies were covered in the scale studies, and the researchers paid attention to these subjects.

When the results found in the literature are considered for all phases of scale development and adaptation studies, it is a common understanding that there is no study complying with all conditions required [3; 6; 11; 18]. Moreover, it was discussed in some studies that such deficiencies can lead to a large number of incorrect and incomplete scale studies, and the accuracy and suitability of the scale studies were highlighted [19; 22]. As a view related to this situation that is different from the general, Delice & Ergene [20] reported that in the scale studies they examined, the researchers carried out the steps to be adhered to in the basic sense, but did not report information on some steps that could be considered important.

It should be noted once again that all of these assessments were made in line with the findings that were produced from the information reported in the articles written by the researchers of the studies that we examined.

## 5. Conclusion

In conclusion, the findings and results created within the scope of this study were related and similar to the literature. The issues that diverged from the literature were stated as well as being underlined. This study is important in that it draws attention to issues involving cyber threats, information security, adverse cyber behaviors, cyber-human values and their sub-domains, and contributes to new research in the field.

An assessment of the results of our study and other studies reveals that similar troubles have continued to exist throughout the stages of scale development conducted by different researchers in different years. Given the increasing interest in the scale development and adaptation efforts in the national arena, especially in recent years, shortcomings or errors in a scale study can also be manifested in subsequent scale studies. In other words, researchers can take incomplete or erroneous scales as examples when carrying out scale development studies and repeat the limitations and shortcomings of the scales that have been taken as examples. In this respect, our study is important in that it guides researchers and contributes to the field in eliminating similar difficulties in scale development and adaptation studies.

Based on our research study, the recommendations are presented below to be able to offer more contribution to the field in terms of stages of scale development and for the conduct of more accurate studies:

- Based on the study, it was found that “adverse cyber behaviors” was the most frequently studied subject in this field. It can be suggested that researchers conduct more scale development studies on “cyber-human values” and “information security”, which were the least studied subjects, in order to contribute to the field.
- It is seen that the majority of the scale studies especially have students as the target audience. At this point, in order to contribute to scale studies and the literature, researchers may be

advised to diversify their studies to include different sampling groups of target audiences.

- Researchers may be advised to have knowledge of and report all stages of scale development and adaptation studies in detail in order to be able to contribute to the field.
- This study was limited to the studies indexed in the Web of Science and TR Index and also to the thesis studies found in the National Thesis Center. This should be taken into consideration in similar studies to be conducted, and they should be carried out in a different or broader scope.

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