Adaptation and psychometric evaluation of the Swedish version of the Assessment of Interprofessional Team Collaboration Scale (AITCS-S) for use in occupational health services

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ABSTRACT

Interprofessional team collaboration (ITC) in the Swedish Occupational Health Service is an important part of the service given to the customer. The Occupational Health Service (OHS) could be more competitive if they were able to show how successful is their ITC. The Assessment of Interprofessional Team Collaboration Scale (AITCS) is an instrument that measures ITC in teams working with the client as part of the team. The aim of this study was to adapt the Swedish version of the instrument for use in OHS and to evaluate the psychometric properties of the adapted version and the adapted short version. The study included 472 participants from different OHSs, all members of the trade association of occupational health care in Sweden. Face and content validity of the instrument were assessed, and floor and ceiling effects were measured. Internal consistency was measured with Cronbach’s alpha and an exploratory factor analysis was conducted on the 42-item adapted instrument and the short, 24-item version. The exploratory factor analysis gave a three-factor solution with an eigenvalue >1 and explaining a total variance of 57.1% and 62.3% for the short version. The study concludes that AITCS-S(OHS) as well as the short version, is a reliable and valid questionnaire. Further development of the AITCS-S(OHS) needs to be undertaken and assessed by confirmatory factor analysis.

Introduction

The concept of team, or teamwork, is well known and commonly used in the health care context. However, the understanding of team processes is a challenge because of the many different interpretations of the concept as well as the way these processes vary in effectiveness and between structures (West & Lyubovnikova, 2013). Yet interprofessional team collaboration (ITC) in health care and the social welfare services is an important part of the quality outcome for those in need of support from different professionals within the same organization (Zwarenstein et al., 2009). We therefore need to measure and monitor ITC to ensure the best practice.

The occupational health service (OHS, see Box 1,) is an independent expert resource having the competence to identify connections between health and safety, organization, productivity, and health, and should be hired when employers are unable to fulfill their obligations within health and safety(”Arbetsmiljölag (1977:1160),”). The different professionals within the OHS need to collaborate with each other and with the companies and organizations who are their customers. Together they will enable solutions for complex issues in different work environments and tasks (FHV-delegationen, 2011).

Background

The word “team” could be defined as: a partnership, a relationship where all team members work equally to achieve shared goals and where the client is the main partner; cooperation, where the viewpoint of all team members is listened to and there is a mutual respect between the client and the rest of the team; and coordination, the ability to work together to achieve mutual goals through shared decision-making between health professionals and the client and their next of kin (Dellafiore et al., 2019).

In this paper we will use the definition of “interprofessional team” as a group of three or more persons from different professions working in the OHS, with shared commitment, shared team identity, clear goals, clear team roles and responsibilities, interdependence between team members and integration between work practices (Xyrichis et al., 2018).

Several instruments have been developed to measure team structures for teams in different health care settings (Bookey-Bassett et al., 2016; Brennan et al., 2013; Zwarenstein et al., 2009). Most of the instruments measuring interprofessional collaboration (IPC) have undergone limited psychometric
Box 1. Facts about occupational health service (OHS) in Sweden.

- Occupational health services (OHS), sometimes called "occupational health care", are an independent resource with the skills to identify, describe and address connections between the work environment, organization and production, and health ("Arbetmiljölagten 1977:1160").
- About 4,000 persons work in the OHS in Sweden. The majority are educated as registered nurses, physicians, physiotherapists, ergonomists, psychologists, safety and health engineers, or behavioral scientists, most of them with advanced training.
- An OHS can be organized in different ways:
  - in-house – working within the company which it serves
  - nationwide enterprise – with offices in different places across the country
  - local enterprise – with one or more offices located in a specific geographic area

The Assessment of Interprofessional Team Collaboration Scale (AITCS) is an instrument developed by researchers in Canada to evaluate IPC in teams that work with the patient as part of the team. AITCS contains 37 items including three subscales measuring partnership, cooperation, and coordination, respectively (Orchard et al., 2012). The instrument has been translated into various languages, e.g., German, Italian, Japanese, Rwandan French and Spanish, and has been used to measure and/or evaluate team collaboration and development of team collaboration in different health care and educational contexts (Caruso et al., 2018; Mink et al., 2019; Orchard et al., 2018; Yamamoto & Haruta, 2019). In 2018 Orchard et al. presented a reduced version of the instrument, the AITCS-II including 23 items (Orchard et al., 2018).

To be able to succeed in securing procurements, the OHS in Sweden need to be competitive. It is a challenge to show potential customers how they will benefit from a specific OHS. The strength of an honest and professional OHS is the collective knowledge effected by the combined possibilities that are given when different professionals work together. The OHS therefore need to develop successful teams and convince the customers that they will benefit from the service provided by these teams (FHV-delegationen, 2011). The AITCS has been translated and cross-culturally adapted to Swedish, AITCS-S (Hellman et al., 2016).

The AITCS-S may be suitable for assessing team collaboration at a specific OHS. As the AITCS-S has not been used in an OHS setting before it must be adapted and psychometrically evaluated for this context.

The aim of this study was to adapt the AITCS-S for use in occupational health services and evaluate the psychometric properties of the adapted instrument and the short version of the adapted instrument.

Method

Study design

Data for this psychometric evaluation study were collected using the AITCS-S adapted for use by the OHS.

| Item | AITCS-S (Text translated into English) | Item | AITCS-S(OHS) (Text translated into English) |
|------|-------------------------------------|------|---------------------------------------------|
| 28   | Sätter patientens behov/i centrum (Gives high priority to gaining insight from patients about their wishes/desires) | 31   | Sätter kundens behov/i centrum (Gives high priority to gaining insight from the customer’s wishes/desires) |
| 32   | Sätter kundens önskningar i centrum (Gives high priority to gaining insight from the customer’s employees about their desires) | 33   | Sätter kundens önskningar i centrum (Gives high priority to gaining insight from the customer about their wishes) |
| 34   | Sätter kundens önskningar i centrum (Gives high priority to gaining insight from the customer about their wishes) |      |                                             |

AITCS-S = Assessment of Interprofessional Team Collaboration Scale, version; AITCS-S(OHS) = Assessment of Interprofessional Team Collaboration Scale, Swedish version, adapted for the occupational health service.

Phase 1: adaption of the AITCS-S to occupational health service

AITCS-S contains 37 items rated on a 5-point Likert scale, where 1 = never, 2 = rarely, 3 = sometimes, 4 = often/mostly, and 5 = always (Hellman et al., 2016). Some adjustments were made to make the instrument relevant for measuring IPC in teams in the OHS in Sweden. The adjustments were proposed by the first author with knowledge about OHS and were discussed with the research group as well as with the author responsible for the AITCS-S version.

Some items were split, one item into four new items and three items into two, and consequently the AITCS-S version adapted for OHS, the AITCS-S(OHS), consists of 42 items. Occupational health services work with companies and organizations and their employees, not with patients. Therefore, original items including the term "patient" were reworded and split into two to distinguish between the companies/organizations (i.e., the customers) and their employees, since either the company or the employee can be the object of the team effort, see Table 1.

The last item in the AITCS-S, “Team members openly support inclusion of the patient in their team meetings,” was excluded from the AITCS-S(OHS) because the OHS in Sweden work on commission of the customer and the two must work collaboratively, and therefore the customer is already included.

Phase 2: face validity and content validity

One in-house OHS and one nationwide OHS were selected to test the pre-final version of the AITCS-S(OHS) (see box 1). Altogether eight experts at the offices of these two different OHSs filled in the questionnaire to evaluate the face and content validity of the instrument. Face validity and content validity are simply a judgment by experts to see if the instrument are appropriate for the intended purpose (Streiner et al., 2015). The group of experts included five women and three men – one
physician, two registered nurses, two physiotherapists/ergonomists, one behavioral scientist, one psychologist and one safety and health engineer, all specialists in OHS except for the behavioral scientist. Their experience in OHS ranged from 1 to 34 years and the age of the experts varied between 40 and 64 years.

The experts were selected and invited to participate by the manager at their office. During the evaluation, the experts were asked by the first author, who performed the test, to respond to the items in the AITCS-S(OHS) about how they currently perceived their interprofessional teamwork.

The sessions for the evaluation took place on four different occasions to arrange a suitable time for the experts. Four of the experts together participated on one occasion, two on another and the remaining two experts each attended an individual meeting.

While answering the questionnaire the experts were asked to “think aloud” to let the author hear their reflections about the items (De Vet et al., 2011). Face and content validity were established as the experts perceived the items in the AITCS-S(OHS) to be relevant to their team-based work. No further adjustments or changes were made to the instrument after the input from the experts.

**Phase 3: psychometric evaluation**

**Survey, sample and procedure**
The survey consisted of four different parts. Part one contained 13 background questions on demographic variables; part two consisted of Nordic questionnaire for psychological and social factors at work (QPS Nordic), an instrument with 112 items measuring psychosocial and social factors at work; part three consisted of the 42 AITCS-S(OHS) items; and part four contained an open-ended question, “Is there anything else you would like to add or comment on? Please feel free to do so.” The result of the psychometric analyses of AITCS-S(OHS) will be reported in this paper. The results of the analyses from QPS-Nordic, AITCS-S(OHS), and the open-ended question will be reported elsewhere.

The survey was completed by employees in different OHSs in Sweden during October 2018 until June 2019 (n = 472). The postal address of each OHS was provided by Swedish Association of Occupational Health and Safety (in Swedish, “Sveriges Företagshälso”), the trade association of occupational health care in Sweden (n = 461). A letter was sent to the manager of each of the OSHs to inform them about the survey and ask them to encourage their employees to answer the questionnaires that they would receive at the OHS a few weeks later. The managers were also asked to distribute the questionnaires to their employees that fulfill the inclusion criteria. One OHS organization (with seven offices) informed us that they would not participate because of an upcoming reorganization. Another OHS organization with five offices responded that they would only let one team in the organization answer the questionnaire.

Approximately 2 weeks after sending the information letter, the questionnaire was posted (n = 2,035). Every OHS office received five questionnaires. The questionnaires were addressed to each occupation group at the OHS, such as one for; the occupational health nurse, the physiotherapist/ergonomist, the psychologist/behavioral scientist, occupational health physician, and safety and health engineer. Attached to the questionnaire was an information letter about the survey and a prepaid envelope addressed to the first author to be used for returning the survey. Some of the questionnaires were returned because of a wrong address (n = 79). New addresses were found for 32 of these potential respondents and the questionnaires were sent once again.

**Psychometric testing of the full and short version of the AITCS-S(OHS)**
During the time of data collection for this paper a short version of the AITCS was developed and published (Orchard et al., 2018). For this reason, we decided to conduct psychometric testing of the items in the shortened instrument as well as the full instrument.

Data are presented as mean, median, range, number, and percentage. Cronbach’s alpha was calculated, and exploratory factor analysis (EFA) was conducted for each subscale and for the total instrument. A Cronbach’s alpha between 0.70 and 0.95 is considered to be good (Terwee et al., 2007). All statistical calculations were conducted using SPSS version 26 (IBM Corp., Armonk, NY, USA).

**Reliability: internal consistency**
Internal consistency is the degree of interrelatedness among the items in an instrument and was measured with Cronbach’s alpha and EFA (Mokkink et al., 2010). Cronbach’s alpha was calculated for the subscales, and for the whole instrument in both the full and the short version, to evaluate correlations between the items. To determine the appropriateness of the data for factor analysis Kaiser-Meyer-Olkin, with a recommended value of ≥0.6 and the Bartlett test of sphericity significant at α < 0.05 was conducted. An EFA with varimax rotation and Kaiser normalization was conducted to determine the factor loadings and the underlying relationships between the items in the AITCS-S(OHS) and the AITCS-S-II(OHS). The sample size was in accordance with recommendations (rules of thumb vary, from 4 to 10 subjects per variable, and a minimum of 100 subjects to ensure stability of the variance-covariance matrix) (Terwee et al., 2007). Therefore, the number of respondents was adequate in relation to the number of items, i.e. 42 item/472 respondents.

**Floor and ceiling effects**
Floor and/or ceiling effects occur if more than 15% of the respondents achieve the lowest or the highest possible score. Floor and ceiling effects were calculated for the whole instrument and for each subscale in both the AITCS-S(OHS) and the AITCS-S-II(OHS).

**Ethical considerations**
The study was ethically approved by the Regional Ethics Committee in Uppsala (2018/180).
Table 2. Respondents’ gender and occupation.

| Gender                        | N (%)  |
|-------------------------------|--------|
| Female                        | 314 (66) |
| Male                          | 151 (32) |
| Opted not to disclose their gender (excluded) | 3 (0.6) |
| Missing values                | 4 (8)  |
| Total                         | 472 (100) |

Occupation
- Safety and health engineer: 50 (11)
- Physician: 87 (18)
- Psychologist/behavioral scientist: 87 (18)
- Physiotherapist/ergonomist: 91 (19)
- Registered nurse: 142 (30)
- Other*: 4 (1)
- Missing values: 11 (2)
- Employer: 83 (18)
- Public sector: 367 (78)
- Private sector: 22 (5)

*operations manager, naprapath, wellness educator and assistant nurse

By answering and returning the anonymous questionnaire, the respondents gave their consent.

Results

Study participants

The questionnaire was answered by 472 individuals who represented various professions working in OHS in the public as well as the private sector, see Table 2. The mean age of the respondents was 52 years, range 25–77 years (SD = 10.5), with a median of 10 years’ experience in OHS, range 0–38 years (SD = 9.5), mean 11 years.

Reliability

Internal consistency, 42-item AITCS-S(OHS)

The Kaiser-Meyer-Olkin was 0.958 and the Bartlett test of sphericity had a significance of \( p < .001 \). Therefore, the data set was adequate for conducting an EFA. The EFA revealed the presence of six components with eigenvalues >1. The total variance explained was 66.1%. Since the original AITCS consists of three subscales the components were forced into three, with variance explained in 57.1%. The rotated and forced matrix is shown in Table 3, with the highest loading for each item presented in the Table, range 0.835–0.407. The items in the subscales when forcing the components into three were differently distributed than in the original instrument. The subscales on partnership and cooperation were identified and included 18 items each. The third subscale included six items named person-centered care instead of coordination, because all six items in the subscale describe the relation with the client and not with the other professionals.

Cronbach’s alpha for AITCS-S(OHS) varied from 0.86 to 0.96 for the subscales and 0.97 for the instrument in total, see Table 5.

Internal consistency, 24-item AITCS-S-II(OHS)

The Kaiser-Meyer-Olkin was 0.944 and the Bartlett test of sphericity had a significance of \( p < .001 \), for the short instrument. An EFA with varimax rotation and Kaiser normalization was conducted on the AITCS-S-II(OHS). The EFA gave a three-factor solution with no forcing necessary. The three components with eigenvalues >1 explained a total variance of 62.3%. The rotated matrix for the AITCS-S-II(OHS) and the highest loading of each item are presented in Table 4, range 0.823–0.462. In the rotation, three items loaded differently from the original instrument: three subscales were identified and named partnership, cooperation and coordination.

In the shortened instrument, the AITCS-S-II(OHS), Cronbach’s alpha varied from 0.79 to 0.93, and 0.95 for the total instrument, see Table 5.

Floor and ceiling effects

No signs of floor or ceiling effects were detected for the AITCS-S(OHS) or AITCS-S-II(OHS) overall or for any of the subscales. However, all the scales were negatively skewed.

Discussion

Psychometric evaluation and development of the instrument

The results of the psychometric evaluation of the adapted instrument AITCS-S(OHS) as well as the shortened version AITCS-S-II(OHS) support the intended use as a self-administered questionnaire for measuring IPC within teams in the OHS. The Cronbach’s alpha for the 42-item AITCS-S(OHS) indicates that there may be redundancy in the instrument. By comparison, Cronbach’s alpha for the AITCS-S-II(OHS) is lower for each subscale as well as for the instrument in total. An acceptable Cronbach’s alpha is usually between 0.70 and 0.90 and a value of 0.98 or more indicates that there may be redundancy in the instrument (Drost, 2011; Terwee et al., 2007; De Vet et al., 2011). In this study, whereas the higher Cronbach’s alpha may indicate that there is redundancy of items in the full version of the instrument, the Cronbach’s alpha for the shortened version is still satisfactory. Also, the explained variance of 57% for the AITCS-S(OHS) overall, compared with 62% for the AITCS-S-II(OHS), suggests that the shorter instrument is more robust.

The EFA for the full instrument gave six components with eigenvalues >1, which indicates differences in the translated, Swedish-version instrument compared with the original Canadian instrument. When forcing the components into three, one subscale was identified to be about person-centered care. This is similar to “patient-centred, collaborative care,” one of the subscales in the Japanese version of the instrument (Yamamoto & Haruta, 2019). Yamamoto and Haruta (2019) explain this using the Japanese terms for being in an “in-group” or an “out-group” and go on to explain that patient participation in decision-making is quite new in Japan. And although person-centered care has been a concept in the Western world for several decades it is still developing, and this may influence the EFA also in the AITCS-S(OHS).

According to Beaton et al. (2000), an adapted version of an instrument is expected to perform in a similar way as the original instrument when a similar test is conducted. Since no EFA was conducted on the translated AITCS-S in earlier studies we do not know whether the differences that have
occurred are due to the translation and cultural adaptation of the instrument or whether they are due to the adaptation for the OHS context, or whether the two, the translation and the adaptation for OHS, have both influenced the changes. The Swedish version of the instrument has been kept as close as possible, regarding the language, to the Canadian version during the translation (Hellman et al., 2016). When adapting the instrument to an OHS version we wanted it to be as close as possible to the original version of the (translated) AITCS-S so as not to distort the content of the instrument. The face validity was considered generally good when Hellman et al. (2016) piloted the instrument. When the experts tested the pre-final version of the AITCS-S(OHS) they considered the items to be relevant. By letting one or more experts make a judgment on the relevance of items and on whether they are appropriate for the intended purpose, face and content validity will be achieved (Streiner et al., 2015). However, some comments regarding the statements emerged when Hellman et al. (2016) piloted the AITCS-S and some respondents in our survey made comments about the relevance of the statements in the items. This indicates that the instrument needs further cultural and conceptual adaptation.

The translation of the AITCS-S was done with thoroughness (Hellman et al., 2016). However, Beaton et al. (2000) point out the importance of cross-cultural adaptation, which includes not only good language translation of an instrument but also an adaptation on a cultural and conceptual level. In an attempt to keep the language as close as possible to the original instrument the cultural and conceptual adaptation may not have received enough attention (Beaton et al., 2000; Rode, 2005). At first sight the translated and adapted instrument looks good, but when scrutinized we must admit that the cultural and conceptual adaptation needs further development.

| Item                                                                 | Partnership | Cooperation | Patient-centered care |
|----------------------------------------------------------------------|-------------|-------------|-----------------------|
| 1. Team members jointly agree to communicate plans                   | 0.756       | 0.689       |                       |
| 2. Team members consider alternative approaches to achieve shared goals | 0.665       | 0.662       |                       |
| 3. Team members meet and discuss the customer’s employees care on regular basis | 0.658       | 0.627       |                       |
| 4. All members in our team are involved in goal setting for each employee of our customer | 0.756       | 0.643       |                       |
| 5. Team members establish deadlines for steps and outcome markers regarding care of the customer’s employees | 0.450       | 0.579       |                       |
| 6. We encourage each other and the customer’s employees to use the knowledge and skills that each of us can bring in developing efforts | 0.416       | 0.579       |                       |
| 7. There is support from the organization for teamwork               | 0.579       | 0.615       |                       |
| 8. We encourage each other and the customer to use the knowledge and skills that each of us can bring in developing plans of care | 0.48     | 0.615       |                       |
| 9. We establish agreement on goals for each customer’s employee we care for | 0.579       | 0.615       |                       |
| 10. Team members coordinate health and social services                | 0.579       | 0.615       |                       |
| 11. All team members in our team are committed to the goals set out by the team | 0.548       | 0.518       |                       |
| 12. The leader of the team varies depending on the needs of the customer’s employees | 0.518       | 0.507       |                       |
| 13. We select the leader of our team                                 | 0.513       | 0.489       |                       |
| 14. We include the customer’s employee in setting goals for their care | 0.488       | 0.450       |                       |
| 15. We include the customer’s employee in setting goals for their care | 0.488       | 0.450       |                       |
| 16. We listen to the wishes of the customer’s employee when determining the process of care chosen by the team | 0.450       | 0.579       |                       |
| 17. Uses an agreed-upon process to resolve conflicts                  | 0.433       | 0.601       |                       |
| 18. We encourage each other and the customer to use the knowledge and skills that each of us can bring in developing efforts | 0.407       | 0.579       |                       |
| 19. Team members are open and honest with each other                 | 0.835       | 0.792       |                       |
| 20. When we work in teams we respect and trust each other            | 0.781       | 0.742       |                       |
| 21. We establish a sense of trust among the team members              | 0.781       | 0.742       |                       |
| 22. We help and support each other                                   | 0.781       | 0.742       |                       |
| 23. We strive to achieve a mutually satisfactory resolution for differences of opinions | 0.722       | 0.698       |                       |
| 24. Team members listen to and consider other members’ opinions/views regarding individual care plan processes | 0.686       | 0.694       |                       |
| 25. We understand the boundaries of what each other can do          | 0.686       | 0.694       |                       |
| 26. We understand that there are shared knowledge and skills between health providers | 0.686       | 0.694       |                       |
| 27. We feel a sense of belonging to the group                         | 0.659       | 0.579       |                       |
| 28. We encourage and support open communication, including the customer’s employee and the customer during team meetings | 0.650       | 0.579       |                       |
| 29. The team makes changes to their functioning based on reflective reviews | 0.645       | 0.579       |                       |
| 30. When care decisions are made, the leader strives for consensus of planned processes | 0.625       | 0.579       |                       |
| 31. The team creates a cooperative atmosphere among the members when addressing the situation of customer’s employees | 0.614       | 0.579       |                       |
| 32. Team members share the power with each other                     | 0.576       | 0.47        |                       |
| 33. We apply a unique definition of interprofessional collaborative practice to the practice setting | 0.474       | 0.471       |                       |
| 34. There is a consistent communication with team members to discuss the care of the customer’s employees | 0.471       | 0.467       |                       |
| 35. The team works with the customer in adjusting the care plan      | 0.467       | 0.462       |                       |
| 36. The team works with the customer’s employees in adjusting the care plan | 0.462       | 0.467       |                       |
| 37. The team gives high priority to gaining insight from the customer’s employee’s wishes | 0.801       | 0.755       |                       |
| 38. The team gives high priority to gaining insight from the customer about their wishes | 0.755       | 0.657       |                       |
| 39. The team gives high priority to gaining insight from the customer about their desires | 0.601       | 0.576       |                       |
| 40. The team gives high priority to gaining insight from the customer’s employee about their desires | 0.601       | 0.576       |                       |
| 41. The focus of the teamwork is consistently the customer           | 0.576       | 0.456       |                       |
| 42. The focus of the teamwork is consistently the customer’s employee | 0.456       | 0.456       |                       |
Table 4. Exploratory factor analysis for the 24-item, shortened Assessment of Interprofessional Team Collaboration Scale, Swedish version, adapted for the occupational health service (AITCS-S-III(OHS)).

| Item                                                                 | Subscales                  | Partnership | Cooperation | Coordination |
|----------------------------------------------------------------------|----------------------------|-------------|-------------|-------------|
| 1. We listen to the wishes of the customer’s employee when determining the process of care chosen by the team | 0.719                      |             |             |             |
| 2. The team works with the customer in adjusting the care plan       | 0.708                      |             |             |             |
| 3. The team works with the customer’s employees in adjusting the care plans | 0.677                      |             |             |             |
| 4. Team members meet and discuss the customer’s employees care on regular basis | 0.662                      |             |             |             |
| 5. We include the customer’s employee in setting goals for their care | 0.657                      |             |             |             |
| 6. We encourage each other and the customer’s employees to use the knowledge and skills that each of us can bring in developing plans of care | 0.642                      |             |             |             |
| 7. We encourage each other and the customer to use the knowledge and skills that each of us can bring in developing plans of care | 0.625                      |             |             |             |
| 8. All members in our team are involved in goal setting for each employee of our customer | 0.615                      |             |             |             |
| 9. There is a consistent communication with team members to discuss the care of the customer’s employee | 0.462                      |             |             |             |
| 10. Team members are open and honest with each other                 |                            | 0.823       |             |             |
| 11. We strive to achieve a mutually satisfactory resolution for differences of opinions | 0.791                      |             |             |             |
| 12. We establish a sense of trust among the team members             |                            | 0.771       |             |             |
| 13. When we work in teams we respect and trust each other            |                            | 0.746       |             |             |
| 14. We understand the boundaries of what each other can do           |                            | 0.728       |             |             |
| 15. The team makes changes to their functioning based on reflective reviews |                            | 0.724       |             |             |
| 16. Team members understand that there is shared knowledge and skills between health professions |                            | 0.678       |             |             |
| 17. We encourage and support open communication, including the customer’s employees and the customer during team meetings |                            | 0.638       |             |             |
| 18. Team members share the power with each other                     |                            | 0.603       |             |             |
| 19. We apply a unique definition of interprofessional collaborative practice to the practice setting |                            | 0.528       |             |             |
| 20. The leader of the team varies depending on the needs of the customer’s employees |                            | 0.819       |             |             |
| 21. We select the leader of our team                                 |                            | 0.815       |             |             |
| 22. The goals that the team members agree upon are equally divided among the team |                            | 0.611       |             |             |
| 23. Team members coordinate health and social services               |                            | 0.550       |             |             |
| 24. Uses an agreed-upon process to resolve conflicts                  |                            | 0.525       |             |             |

Table 5. Cronbach’s alpha for the AITCS-S(OHS) and AITCS-S-II(OHS).

| Scale/subscale | AITCS-S(OHS) | AITCS-S-II(OHS) |
|----------------|-------------|-----------------|
|                | No of items | Cronbach’s alpha | No of items | Cronbach’s alpha |
| Partnership    | 18          | 0.927           | 9            | 0.900            |
| Cooperation    | 18          | 0.958           | 10           | 0.934            |
| Person-centered care | 6 | 0.860 |               |                 |
| Coordination   |             | 0.797           |              |                 |
| Total          | 42          | 0.971           | 24           | 0.950            |

AITCS-S(OHS) = Assessment of Interprofessional Team Collaboration Scale, Swedish version, adapted for the occupational health service; AITCS-S-II(OHS) = the shortened Assessment of Interprofessional Team Collaboration Scale, Swedish version, adapted for the occupational health service.

Considering the result of the study we have identified items that need further development in the instrument. The Swedish health care system is supposed to primarily administer to the patients’ needs, rather than follow their wishes. Yet, instead of removing “wishes” from the item that was translated into “wishes/needs” we divided the item in two. This item ought to be removed when doing a conceptual adaptation. Items should be specific, short and clear to facilitate reading and understanding them, and hence ensure that the respondents’ answers provide the desired information (Beaton et al., 2000; Rode, 2005; Terwee et al., 2007; De Vet et al., 2011). Some items in the instrument are double-barreled and this makes them unclear. For instance, how should you answer the item “When we work together in teams we respect and trust each other” if you agree with just one of the two parts of the statement? Respect and trust do not necessarily coexist.

**Teamwork and interprofessional collaboration**

An uncritical understanding of interprofessional work and teamwork as a singular phenomenon is common in the literature (Dow et al., 2017; Reeves et al., 2018). West and Lyubomnikova (2013) point out that the concept of team is well known, and commonly used, yet it is a challenge to reach an academic understanding of the concept. Therefore, it is also a challenge to develop an instrument that measures collaboration within teams. When we ask, “When we work in a team, we apply a unique definition of interprofessional collaborative practice to the practice setting” we assume that there is a clear definition of “team” or “IPC” at each setting and that this definition is well known among the team members.

When developing an instrument, it must be clear what is to be measured, in which population and for what purpose (De Vet et al., 2011). We wanted to measure IPC in teams in OHS to see to what extent the participants perceived that team collaboration works. We had an idea that ITC might be different in occupational health service, but while working on the project and reading literature about teams, and IPC among teams in different contexts we found that even though the contexts differ the purpose of team collaboration is normally
the same: namely, to optimize the delivery of health service and patient care (Zwarenstein et al., 2009). In the OHS context the professionals work with the customers and their employees. This was identified as something that cannot be compared with other team collaborating contexts that include a patient who is part of the team. When working through the idea comprehensively, other health care settings in which the team had to consider the needs of others, not just the patients, were identified. Examples are work with adolescents, patients with dementia, psychiatric patients and oncology patients. In such cases, the patient’s relatives may have a role in their care and, accordingly, the team members must take the relatives’ needs into consideration and work with them as part of the team as well (Lood et al., 2019). Thus, the instrument needs to be developed to measure and monitor the collaboration (including partnership, cooperation and coordination) of the patient as well as of the third part, and the context is of less importance.

There are some other issues to pay attention to when measuring IPC in teams, such as the organizations’ support for ITC, the leadership, stereotyping, and the team task (Brewer et al., 2016; Dellafio et al., 2019; Prentice et al., 2016; Rachma Sari et al., 2018; Thylefors, 2012, 2013). These need to be studied further.

It is important to keep in mind that even though we want to measure IPC in teams, where the patient/client/employee is part of the team, most instruments do not measure this person’s experience of partnership. Rather, the instruments, the AITCS included, evaluate the professional’s perception of the patient/client/employee’s participation in team collaboration.

**Limitations**

The study has some limitations to be announced. Because of the way the questionnaire was distributed, we do not know how many of the questionnaires reached the potential respondents and therefore we have no possibility to calculate the response rate. Due to the General Data Protection Regulation, GDPR (Regulation 4.5.2016), the employer is not allowed to distribute their employees private postal address or e-mail address. The survey was therefore distributed to the manager of the OHS office that in turn distributed the survey among their employees. However, this might lead to selection bias. Furthermore, since the survey was extensive the respondents may have refrain to answer it or been fatigued when answering it though the survey included 167 questions in total. This may have affected the response rate as well as led to a response bias. An alternative could have been to send out the two different surveys at two different occasions. Another limitation is also that some of OHS offices choose not to participate. The reason why was an upcoming re-organization.

**Conclusion**

Partnership, cooperation and coordination are vital parts of IPC in teams. These three characteristics are measured in the three subscales in the AITCS-S; therefore, the instrument can be said to measure what it is intended to measure. Psychometric testing confirmed that the instrument is a valid and reliable tool. Instead of further developing the AITCS-S-II(OHS) we suggest adapting the AITCS-S-II culturally and conceptionally by reviewing and developing the items. Based on the high Cronbach’s alpha it is possible that the AITCS-S-II could be even shorter, and still retain its validity and reliability. Confirmatory factor analysis as well as hypothesis testing needs to be performed to evaluate and further develop the instrument. Developing the AITCS-S-II into an instrument that can be used in different health care settings where the interprofessional team works with the patient, and sometimes with their relatives, as part of the team could benefit both teams in OHS and interprofessional teams in other health care settings.

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