Research and Theory

Exploring perceptions of interprofessional collaboration in child mental health care

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Abstract

Purpose: This paper proposes a tentative theoretical model (PINCOM) and a measure of mental health and school professionals' perception of interprofessional collaboration (IPC).

Theory: The model is based on twelve constructs derived from a pilot study, organizational and social psychology. The main aim of the model is to capture central aspects of IPC.

Method: A forty-eight item self-report questionnaire (PINCOM-Q) was designed to explore professionals' perceptions of IPC. The sample (n = 134) included professionals who worked in primary care, specialist services and in elementary schools. Exploratory factor analyses and reliability testing were conducted to reduce the large number of variables in the questionnaire.

Results: Results indicate that central aspects of IPC in the context of service delivery and case work are: interprofessional climate, organizational culture, organizational aims, professional power, group leadership and motivation.

Conclusion: Preliminary empirical testing of the questionnaire demonstrated that it is possible to measure perceptions of IPC, with reasonable levels of construct validity and reliability.

Discussion: Further, revision of the questionnaire is discussed to make it fit for use in large scale studies with the purpose of enhancing (a) the validity of the PINCOM model, and (b) the quality of mental health services that are based on IPC.

Keywords

interprofessional collaboration, child mental health care, measurement

Introduction

Since the term collaboration seems to carry many meanings, it should be of high relevance to investigate how professionals perceive the *phenomenon* of collaboration. Magnusson [1] claims that there is a conceptual distinction between the environment 'as it is' and the environment 'as it is perceived', construed, and represented in the mind of an individual who is appearing and acting in it on a certain occasion. The perception of the world by different persons will be different, since each individual perceives the world in terms of those aspects that have special significance for him [2]. A special case of *social perception* was presented by Fritz Heider, who claimed that when we are trying to decide why people behave as they do, we can make either an internal (dispositional and personal) attribution or an external (situational) attribution [3]. It is suggested that in the case of interprofessional collaboration, professionals may create meaning by assigning causality to dispositional or situational factors.

Interprofessional collaboration in child mental health care

Levin and Hanson [4] found that one in five children experience a diagnosable mental disorder, with eleven percent of the child population experiencing functional impairment. Psychopathology in childhood arises through a complex multi-layered interaction of the child's characteristics (including biological, psychological genetic factors) and the environment (including parent, sibling, and family relations, peer and neighbourhood factors, school and community factors, and the larger social-cultural context) [5]. The most common problems are emotional disorders, hyperactivity disorders, behaviour problems, relational problems and problems related to dysfunctions in pro-social behaviour [6].

Professionals throughout the western world seem to agree that there are many potential difficulties in achieving effective working relationships [7–11]. For example, differences in management styles affect efforts to collaborate between health and social services [12] and elements of competition are embedded in relationships between organizations and professions [13].

Presently, the health care system for children and adolescents with mental health problems is complex, fragmented and uncoordinated [5,14,15]. The goals of the Norwegian welfare state are to achieve equality in as many aspects of life as possible, to redistribute the wealth and to provide security for all. Thus, there is a strong dominance of public funds and the most dominate pillar of the welfare state is the social security system [16]. A child having a mental health problem may receive help from several professionals in primary care (school psychology services, child guidance centre, or health nurses). If the problem of the child is considered to be of a certain level of seriousness, the parents may want a general practitioner to refer their child to specialist services. Andersson et al. [17] report that in Norway, 3.1 percent of the child- and adolescent population received treatment from the specialist services in 2003. Central national policy documents in Norway, states that a national goal is to improve productivity and development of new services in order to be able to provide five percent of children and adolescents with special services [17].

The meaning of interprofessional collaboration

There are many ways to describe collaboration in the health and social services, and some examples are: interprofessional collaboration, multiprofessional collaboration, interdisciplinary collaboration, interagency coordination [18] and integrated care [19].

Kodner and Spreeuwenberg [19] assert that *integrated care* has many meanings and provide the following definition: ''Integration is a set of methods and models on the founding, administrative, organizational, service delivery and clinical levels designed to create connectivity, alignment and collaboration within and between the cure and the care sectors'' (p. 3). Biggs [20] claims that *interprofessional* refers to relations between different professional groups and that each one of these will have a distinctive professional culture. Barr et al. [13] hold that *collaboration* is an active and ongoing partnership, often between people from diverse backgrounds, who work together to solve problems or provide services. Barr et al. [13] also

claim that collaboration is sometimes understood synonymously with *teamwork*, but that the construct collaboration should involve a much broader understanding: Collaboration is not only between professions, ''it is also between organizations, education, health, housing, law enforcement, social care, income maintenance and others; between practice settings— residential and community; and between sectors— statutory, voluntary and commercial'' (p. 5).

Within the context of service delivery and case work, collaboration may be classified several ways and Doherty [21] has defined five different levels of collaboration that refer to both the extent to which collaboration occurs and to the capacity for collaboration in a given health setting as a whole: minimal collaboration (1), basic collaboration at a distance (2), basic collaboration at site (3), close collaboration in a partially integrated system and (4) close collaboration in a fully integrated system (5).

The concepts used to describe central aspects of health care provision are overlapping and incomplete and sometimes appear as 'buzzwords' in both the literature [19] and in policy documents. Meads and Ashcroft [22] claim that ''warm fuzzy words can mask a complex and, at times, painful reality'' (p. 15). Therefore, there seems to be good reason to define constructs like *collaboration* in ways that makes operationalization possible, hence, making way for empirical studies.

Empirical investigation of interprofessional collaboration

It has been suggested that clearer definitions and the development of theoretical models will help lead to an increase in empirical studies—which have been sorely lacking. Many authors in the field, for example Naar-King, Siegel, Smyth and Simpson [23], claim that there is a paucity of systematic assessment of collaborative disciplinary programs and the services they provide although a substantial body of medical literature endorses the importance of collaborative disciplinary approaches in assessment and management of children with special health care needs. Leathard [24] concludes that interprofessional evaluation has been limited with the exception of significant assessments from the field of interprofessional education, as well as from studies that focus on specific policy initiatives. Martin-Rodriguez, Beaulieu, D'Amour and Ferrada-Videla [25] found that very few studies have investigated the influence of systemic, organizational and interactional determents on interprofessional collaboration and that published work relies mainly on a conceptual approach rather than on empirical data.

The general situation is that the empirical studies that exist within the field of *interprofessional collaboration* are sparse [26]. Some studies have used *perception* or *attitudes* as a theoretical point of departure [27–31]. Still, these studies focus mainly on interprofessional education and how professionals perceive each other as professionals. Thus, they deal only partly and indirectly with the phenomenon of *collaboration* in a clinical context. In this study, the investigation of how professionals perceive collaboration as a phenomenon was approached by the development of a questionnaire.

Aims

The present study was part of a larger study whose main scope was to investigate how professionals perceive interprofessional collaboration in service delivery to children with mental health problems [32,33]. As there have been few attempts to capture and quantify elements of successful collaboration, the main aims of the present study are 1) to present the development of the questionnaire (PINCOM-Q), 2) to investigate features of the PINCOM-Q using reliability testing and exploratory factor analysis and 3) discuss how a revised version of the PINCOM-Q could be applied in large scale studies with the purpose of improving (a) the PINCOM model, and (b) the quality of the services.

Methods

Sample and procedure

A total of 157 questionnaires were distributed to professionals engaged in interprofessional collaboration in relation to children with mental health problems, in the western part of Norway. The sample must be considered as a convenience sample, based on easy availability of respondents. Consent from the professionals was obtained by voluntary participation. The study and its purpose were described on a separate page in the questionnaire according to standards prescribed by the Norwegian Data Inspectorate. The project was presented for the *Regional Research Medical Ethical Committee* which concluded that the project was outside the mandate of the committee.

Participants were employed in specialist services, primary care or public schools and a wide number of professionals participated in the study. Teachers in elementary schools were included as informants since they often participate in interprofessional collaboration groups in the context of helping children with mental health problems [32–34]. The response rate was 86%

(n = 134). Eighty-one percent were female. Mean age was 46 years (S.D. = 9.9, Range = 20–66).

It is difficult to investigate if the sample represents the population of health and social workers and teachers within the field of child mental health care. The sample may be described as heterogeneous, because it includes professionals from different health care levels and teachers in elementary schools. An attempt was made to compare the sample with available official statistics (Norwegian Central Bureau of Statistics) and the distribution of men and women in the present study was compared to the population of health and social workers. The percentage of men and women working as professionals within health and social work in Norway are 17.5% and 82.5%, respectively, which is slightly different from the sample in this study. It should be noted that families were not included in the study as informants, although families are, of course, deeply involved when a child has mental health problems [35].

Development of PINCOM-Q

A primary goal of developing the questionnaire was to create a valid measure of the underlying main construct *perception of interprofessional collaboration*. As mentioned above, there have been few attempts to measure perception of interprofessional collaboration. In the development of PINCOM-Q, several key steps were taken to achieve construct validity [36].

First, the questionnaire, denoted as PINCOM-Q, was based on a tentative and theoretical model called PINCOM (**P**erception of **IN**terprofessional **CO**llaboration **M**odel). The creation of PINCOM was based on a pilot study [34] and relevant literature, and contained twelve constructs. The main idea was to gain thorough information about the phenomenon of interprofessional collaboration, so that the theoretical constructs chosen to be included in the theoretical model were within the domain of the phenomenon. The pilot study [34] provided some information about the perceived complexity of the phenomenon; experiences of interprofessional collaboration were found on the individual, group and organizational level. This corresponded well with relevant literature within organizational psychology. French and Bell [37] recommended that scientific study of organizational developmental activities should include analysis of individual behaviour in the context of being member of organizational systems, group members and individuals. The PINCOM includes three context levels, illustrated in Figure 1. The most influential contribution in choosing central constructs that could describe central aspects of collaboration was from the literature of organizational
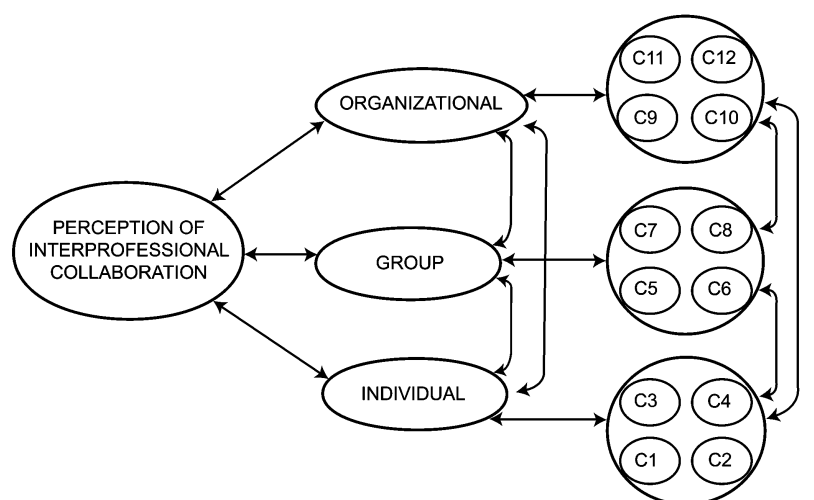
C1 = motivation, C2 = role expectancy, C3 = personality style, C4 = professional power, C5 = group leadership, C6 = coping, C7 = communication, C8 = social support, C9 = organizational culture, C10 = organizational goal, C11 = organizational domain and C12 = organizational environment

Figure 1. The perception of interprofessional collaboration model (PINCOM).

psychology, more specifically, the questionnaire QPS Nordic [38] which focuses upon psychological and social factors at work.

In accordance with the main construct and the sub-constructs in Figure 1 above, the following working definition of interprofessional collaboration is suggested: *perceptions and behaviour between professionals in the interprofessional collaboration process on an individual, group and organizational level.*

Individual aspects that may be involved in interprofessional collaboration processes are extensive and the ones highlighted in the PINCOM are: *professional power* (*C1*)*, role expectations* (*C2*)*, personality style* (*C3*) and *work motivation* (*C4*). It is suggested that these constructs represent central aspects of individual influence in the interprofessional collaboration processes. For example, *professional power* is related to the notion that some individuals in interprofessional groups have more influence than others on the group process [39]. Interprofessional groups will have much in common with working groups and teams in general and *group aspects* (constructs) in the PINCOM are: *leadership* (*C5*)*, coping abilities* (*C6*)*, communication* (*C7*) and *social support* (*C8*). As an example, it is suggested that leadership in interprofessional groups, as in other groups, is focused around social influence and goal achievement. Professionals in interprofessional groups will also represent the organizations they belong to, especially when working with professionals from other organizations present. *Organizational aspects* in the PINCOM are *organizational culture* (*C9*)*, organizational environment* (*C10*)*, organizational aims* (*C11*) and *organizational domain*

(*C12*)*. Organizational culture*, for example, may be defined as a pattern of shared basic assumptions that the group has learned while solving its problems of external adaptation and internal integration, that have worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems [40].

Second, without a theoretical framework it is impossible to investigate construct validity as ''one does not validate a test but only a principle for making inferences'' (p. 297) [36]. To ensure good representation of the constructs, a pool of items was formulated as close to the demarcation (definition) of the twelve constructs in PINCOM as possible. Thereafter, an early draft of the questionnaire was administered to some colleagues and items that were unclear and difficult to understand were excluded. The questionnaire used in this study (PINCOM-Q) is a 48-item self-report multidimensional instrument; 34 items were formulated by the author and 14 items were reformulated based on the questionnaire QPSNordic. Each of the twelve constructs (C1–C12) in the theoretical model was operationalized by four indicators, giving the 48 items for the three levels. The items were formulated as statements and rated on a 7-point likert scale, ranging from 'strongly agree' (1) to 'strongly disagree' (7).

PINCOM-Q is presented in Appendix I. In this version of PINCOM-Q the items are labelled by C1–C12, to show all the items representing each construct for the reader. This information was not available for the respondents in the study. A random ordering of

the items was considered, but abandoned, as it was considered unlikely that the respondents would identify the items as representations of each of the constructs. In future studies, however, the items in the questionnaire should probably be placed in random order to avoid a potential response bias.

Statistical analyses

The development of PINCOM-Q is in an early stage and this calls for an exploratory analysis. In this article, exploratory factor analysis (Principal Component Analysis) and reliability analyses were used to explore features of the PINCOM-Q, according to standards in scale development [41–43].

Scale reliability is the proportion of variance attributable to the true score of the latent variable [41], and in the present study, several reliability analyses are presented. First, Cronbach's alphas and split half reliabilities were conducted for the PINCOM-Q (48 items). Reliability analyses for the subscales derived from exploratory factor analyses (PCA) are presented in Table 4. It should be noted that internal consistency is a necessary, but not a sufficient condition for homogeneity or unidimensionality [43]. The 'attenuation paradox' is that the researcher, striving for high reliability, may lose construct validity, because the items representing the theoretical construct are too narrow. This is what Messick [44] describes as *construct underrepresentation*; "the assessment is too narrow and fails to include important dimensions or facets of the construct" (p. 742).

The aim of most factor analytic methods is to simplify a matrix of correlations such that they can be explained in terms of a few underlying factors [45]. The 48-item questionnaire was subjected to exploratory Principal component analysis (PCA), with oblique rotation, for the whole sample. Oblique rotation was preferred as it was assumed that the extracted factor may be correlated. Ideally, confirmatory factor analysis [46] could have been applied, due to the fact that PINCOM-Q was based on a tentative theoretical model (PINCOM). In confirmatory factor analysis an a priori model is specified and tested to investigate if the observed correlation matrix is reproduced. There are two reasons why confirmatory factor analysis was not used in this study. First, the PINCOM model is tentative, that is it is in an early stage of a priority. For example, the twelve constructs included in PINCOM may be replaceable, and constructs like *decision making* and *conflict* and others could have replaced or been added to the constructs in the model. Furthermore, it is possible that the twelve constructs included in the tentative model make it too complex,

and that a reduction of the observations might reveal other meaningful patterns. Secondly, there are relatively few observations available in the study [45]. It is suggested that an exploratory approach may contribute to our understanding of the tentative nature of PINCOM by serving as a useful point of departure for further dialogue and inquiries [47].

Results

Characteristics of the participants

A total of 134 professionals from several professions participated in the study. Drawing a sample of professionals involved in interprofessional collaboration towards children with mental health problems is a complicated matter. Therefore, the mere composition of the sample may itself be regarded as an interesting result. What professionals participate in the collaboration processes and where do they work?

The following professionals (n = 134) participated in the study: teachers (n = 43, 32.1%), special educators (n = 17, 12.7%), psychologists (n = 16, 11.9%), social workers (n = 14, 10.4%), primary nurses (n = 13, 9.7%, child welfare workers (n = 9, 6.7%), medical doctors (n = 7, 5.2%), others (n = 14, 10.4%), missing (profession not registered) (n = 1, 0.7%). In Table 1 the professionals are grouped according to organizational units and health care levels.

Step 1: reliability of the PINCOM-Q
Cronbach's alpha for the whole material was 0.91 (48 items). Split-half reliability was: alpha for part 1 = 0.84 and alpha for part 2 = 0.87. The mean score of each of the variables (constructs) were calculated, based

Table 1 Professionals grouped by organizational units and health care levels

Health care level	Organizational unit	n
Primary care (n = 42)	Primary health nurse	12
	School psychology services A[1]	9
	School psychology services B	5
	School psychology services C	4
	Child protection centre	12
Specialist services (n = 40)	Child psychiatric clinic D	23
	Child psychiatric clinic E	17
Schools (n = 52)	School F	30
	School G	22
Total	Nine organizational units	134

[1] The capital letters A—G are labels to indicate different organizational units. Professionals may work within the same health care level, within the same service, but in different organizational units (for example in different communities).

Table 2 Eigenvalues, percent of variance and cumulative percent of variance

Component	Total	% of Variance	Cumulative% of variance
1	11.24	28.10	28.10
2	3.55	8.87	36.96
3	2.75	6.89	43.85
4	2.39	5.98	49.83
5	1.81	4.54	54.37
6	1.67	4.19	58.56

on four items. The reliability of ten variables, representing the 10 constructs in PINCOM, ranged from moderate to high (0.55–0.82), and only two constructs were excluded from further analysis (*personality style* (0.09) and *organizational environment* (0.18)).

Step 2: Principal Component Analysis (PCA)
The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were used to indicate that a factor analysis was an adequate strategy. The KMO was 0.841, which is considered high and, thus, an indication to perform factor analysis. Bartlett's test of sphericity was used to test the null hypothesis (Ho) that the variables in the correlation matrix were uncorrelated. The observed significance

level was 0.000, therefore, Ho was rejected. It was concluded that the strength of the relationship between variables was strong and that the data met basic criteria to fit a factor analytical design.

Results indicate that the professionals perceived collaboration as a complex phenomenon as several factors emerge in the analysis. The screeplot showed that the 'scree' began to appear between component 6 and component 7, a six-factor solution, explaining 58.5% of the variance. The screeplot showed that the largest component explained 28% of the variance, whereas components 2–6, explained from about 9 to 4% of the variance (see Table 2). In Table 3, the loadings of 28 items on the six largest components are presented. Cut off is set at 0.40, which may be considered as somewhat low, still most of the items included in the six subscales have much higher loadings.

Step 3: investigating reliability of the subscales
Based on the findings presented in Table 2 and Table 3, we may expect six subscales. These subscales are

Table 3 Factor loadings of 28 items. Principal Component Analysis, direct oblique rotation, pattern matrix

Items	Components					
	1	2	3	4	5	6
Social support b	**0.68**	−0.01	0.04	0.16	0.13	−0.04
Social support a	**0.56**	−0.12	0.04	−0.08	0.01	0.04
Social support c	**0.48**	0.06	−0.02	0.09	0.14	0.30
Communication d	**0.47**	−0.28	0.28	0.12	0.11	0.13
Communication b	**0.44**	0.06	0.12	−0.04	−0.13	0.18
Social support d	**0.42**	0.30	0.09	0.03	0.10	−0.04
Communication a	0.38	0.09	−0.06	0.18	0.05	0.05
Organizational culture b	−0.13	**0.73**	0.10	−0.03	0.13	−0.09
Organizational domain d	0.01	**0.61**	−0.10	−0.13	0.12	0.12
Organizational culture c	0.23	**0.52**	0.26	0.03	−0.03	0.05
Organizational culture a	0.36	**0.44**	0.14	0.21	−0.13	0.33
Organizational aims d	−0.13	−0.02	**0.83**	0.06	0.12	−0.00
Organizational aims b	0.11	0.25	**0.74**	0.09	−0.14	−0.01
Organizational aims c	−0.28	−0.12	**0.71**	−0.00	−0.02	0.05
Organizational aims a	0.15	0.14	**0.64**	0.02	−0.15	0.20
Organizational domain a	0.16	−0.15	**0.55**	−0.04	0.21	−0.13
Organizational culture d	0.09	0.24	**0.43**	0.02	−0.08	0.27
Professional power d	−0.10	0.03	0.12	**0.87**	0.02	−0.07
Professional power c	−0.01	−0.00	−0.05	**0.83**	0.00	0.05
Professional power a	0.07	−0.11	−0.03	**0.79**	0.11	0.08
Professional power b	0.01	−0.05	0.11	**0.66**	−0.18	0.00
Coping d	0.23	0.13	−0.09	**0.40**	−0.10	−0.11
Motivation c	0.04	−0.06	0.03	0.07	**0.77**	0.12
Group leadership b	0.14	0.38	−0.10	−0.09	**0.63**	0.03
Group leadership a	−0.01	0.17	0.03	−0.03	**0.62**	0.10
Motivation a	0.04	0.05	−0.00	0.06	0.03	**0.82**
Motivation b	0.02	−0.09	0.11	−0.02	0.02	**0.81**
Motivation d	0.22	0.06	−0.04	−0.11	0.08	**0.67**
Role expectancy a	−0.34	0.02	0.02	0.15	0.29	**0.57**

composed of the highest loadings from the items on the six components in the PCA analysis. To optimize scale length, the subscales were investigated with regard to how each item contributed to the reliability of each of the subscales; that is, what the consequences would be when some of the items were deleted (see Table 4).

As can been seen from Table 4, the deletion of some of the items in the subscales increased the reliability in that particular subscale. For example, the deletion of item *organizational domain d*, still gave a reliability of 0.64 for the *organizational culture subscale*. If six items were deleted (*organizational domain a, d; organizational culture d; coping d; motivation c* and *role expectancy a*), the reliability for the particular subscales increased or remained the same. The total reliability for the questionnaire including 22 items is 0.87.

Discussion

The development of PINCOM-Q

The development of PINCOM-Q is an attempt to measure perceptions of interprofessional collaboration. The literature clearly shows that empirical investigations of collaboration have been sorely lacking within the field, where conceptualisation has been the main approach to understand the phenomenon of collaboration [23,25,26]. It is suggested that PINCOM-Q has the potential to contribute to increased research within the field.

Results indicate that the phenomenon of interprofessional collaboration may be assessed as a complex phenomenon. According to this study, the major subscales in a revised version of the PINCOM-Q could be: *Interprofessional climate* (*social support/communication*), *organizational culture, organizational aims,*

Table 4 Reliability analyses for six subscales

Subscale/items	No. of items	Cronbach's alpha	95% CI	Cronbach's alpha if item deleted
Interprofessional climate	6	0.84	0.80–0.88	
Social support a				0.79
Social support b				0.81
Social support c				0.80
Social support d				0.83
Communication b				0.82
Communication d				0.83
Organizational culture	4	0.64	0.53–0.73	
Org. culture a				0.53
Org. culture b				0.58
Org. culture c				0.52
Org. domain d				0.64
Organizational aims	6	0.80	0.74–0.85	
Org. aim a				0.75
Org. aim b				0.74
Org. aim c				0.78
Org. aim d				0.74
Org. domain a				0.80
Org. culture d				0.79
Professional power	5	0.82	0.77–0.87	
Professional power a				0.78
Professional power b				0.78
Professional power c				0.78
Professional power d				0.76
Coping d				0.83
Group leadership	3	0.69	0.58–0.77	
Group leadership a				0.61
Group leadership b				0.50
Motivation c				0.69
Motivation	4	0.80	0.74–0.85	
Motivation a				0.70
Motivation b				0.71
Motivation d				0.74
Role expectancy a				0.83
Total*	28	0.88	0.86–0.91	

* = reliability testing of 28 items.

professional power, group leadership and motivation. It is suggested that these subscales represent prominent aspects of interprofessional collaboration, thus, also an argument for content validity. A preliminary interpretation of the results derived in this study demonstrates that PINCOM-Q may contribute to our understanding of how professionals perceive the phenomenon of interprofessional collaboration. Interpretations of the four largest components are given.

The findings indicate that the largest subscale (based on component 1) may be labelled *interprofessional climate*. As professionals, we need to have positive relationships with other people if we are to behave in ways that facilitate high quality work. As identified in research on general factors that promote therapeutic change, positive relationships are associated with *pro-social behaviour, positive attitudes, warmth and respect* [48]. If working relationships lack these qualities, it seems obvious that it will affect the outcomes for the clients. Surely, a professional that finds a collaboration meeting uncomfortable, experiencing lack of *social support*, is not very likely to *communicate* unstrained with the other professionals present.

The second largest component in the PCA was identified as *organizational culture*. Three of the highest loadings on this component were items that represent the construct organizational culture. Different organizational cultures have impact on collaboration processes. Some professionals belong to organizational cultures that enhance collaboration, whereas others do not. How will such differences affect how the interprofessional groups work? Schein [40] claims that the individual will hold on to certain basic assumptions in order to ratify his or her membership in the group. If the most important group for a professional is within the organization the professional belongs to, the professional's perceptions of other groups or organizations will be grounded in the attitudes and perceptions of his own professional group. His meeting with a different group will, thus, be grounded in differences in the very idea of how to collaborate, in the way a problem is understood, and in the way professionals communicate.

The third component in the PCA has highest loadings from items representing the construct *organizational aims*. This is in accordance with literature within the field. Meads and Ashcroft [22], for example, claim that collaboration is needed to ensure strategic coherence of goals and priorities. Professionals may perceive professionals from other organizations as clear or unclear about their goals for participating in the group. Professionals may not clarify (nor perceive the need

to clarify) where they stand on behalf of the organization they belong to, this may cause frustration in the process of interprofessional collaboration.

The fourth component was labelled *professional power*. Based on knowledge of the development of professions within health care [13], it gives meaning that *professional power* has impact on interprofessional collaboration processes. Due to their use of *professional power*, some professionals may, often implicitly, define what themes are to be accepted for discussion. This may suppress other perspectives that could be of substantial importance in the clinical problem-solving process. One example would be a teacher that withholds information about the behaviour of the child. What if this information was in dissonance with the common understanding of the child in the group? The group may intervene on a faulty understanding and this may have major consequences for the child and its family over time.

The reliability analyses presented in the results section show that the questionnaire is internally consistent. After the PINCOM-Q was reduced to 22 items the questionnaire had a reliability of 0.87, which must be considered to be very high in the context of early stage scale development. The six subscales derived from the PCA show moderate to high reliability (0.64–0.84). The deletion of some of the items (see Table 4) gave some advantages by giving shorter subscales. Still, it could be argued that reducing the number of items also reduces the validity of the scale, as the main construct, *perception of interprofessional collaboration*, is underrepresented [44].

As this study and the results are preliminary and have certain methodological limitations, new and alternative reliability approaches should be applied as well. Generalizability theory is one approach that could be useful in this regard [41]. Generalizability theory (GT) was originally presented by Cronbach et al. [49]. GT is a statistical theory and a statistical method that focuses on the dependability of behavioural measurements. Dependability refers to the accuracy of generalizing from a person's observed score on a test or other measure (e.g. behaviour observation, opinion survey) to the average score that person would have received under all the possible conditions that the test user would be equally willing to accept [50]. Shavelson and Webb [51] claim that "the strength of G-theory, is that multiple sources of error in a measurement can be estimated separately in a single analysis". The identification of different variance components made possible in a G-study exceeds the possibilities given in classical test theory. Implicitly, classical test theory conceals variances in the 'general' error component. In an exploratory study of the

PINCOM-Q, this is especially interesting. Under what conditions is it most likely that PINCOM-Q will produce dependent scores? Or to be more specific: what causes the variation in the observed scores—person effect, items effect, contextual effect or interactions of these effects? The application of GT in the further development of the PINCOM-Q, thus, may give new information about the relevance of reducing PINCOM-Q to six subscales, as indicated by results.

The application of PINCOM in research and in clinical practice

In general, the major patterns in the results may be understood in line with Fritz Heider's attribution theory. It is suggested that professionals attribute qualities of interprofessional collaboration to situational or internal dispositions. It is possible that professionals are conscious of these aspects of interprofessional collaboration only at a certain level.

Empirical investigations using PINCOM-Q may give new and substantial information about differences and similarities between groups of professionals regarding how they perceive interprofessional collaboration. If, for example, an investigation of all professionals in a community shows major differences in perceptions of IPC, then leaders could discuss the need for interprofessional training programmes to enhance shared learning among professionals. It has been suggested that interprofessional training programmes could enhance teamwork and, indirectly, also patient care [52,53], by focusing on the development of shared meaning through shared learning processes.

Although perceptions do not produce identified behaviour patterns, it is likely that perceptions, over time, will influence how professionals act in collaboration processes. Follow-up studies, for instance using qualitative interviews, could increase our understanding of how the central aspects in the PINCOM may influence how professionals act in interprofessional groups, as indicated by the results presented above. For example, how will professionals act if they do not get any social support in the group, or if they perceive power imbalance in an IPC group?

A next step could be to study the perceptions of a much larger sample of professionals involved in interprofessional collaboration. There are two main reasons for extending the study: a) observations made by the PINCOM-Q could be tested by other factor analytic procedures, such as confirmatory factor analysis, using software such as LISREL or AMOS, b)

changes could be made in the theoretical model and the questionnaire, both of which could give new and other perspectives on interprofessional processes. This could also contribute to the refinement of the questionnaire PINCOM-Q, making it more robust and useful in relation to other assessment procedures within the field. For example, the measurement of 'the degree of integration' by Ahgren and Axelsson [54] could be used in combination with the 'perceived level of interprofessional collaboration'. Will the level of integration have impact of the level and quality of interprofessional collaboration processes?

Limitations of the study

The interpretation of the factors that emerge in this study must be considered as indicative and tentative, in line with the exploratory approach in this study. For example, the principal components method explains all the variance in the matrix, thus, it must be contaminated by error [45]. The use of oblique rotation method also makes interpretability more difficult, as the factors were assumed to correlate. Furthermore, the results may be difficult to replicate due to the relatively small sample size; it is, however, not uncommon to see factor analyses used in scale development based on more modest samples [41].

The major disadvantage of using a convenience sample is that we have no idea of how representative the information collected about the sample is for the population. For example, it could be that factor analysis based strongly on responses from a large proportion of people from the education sector may bias the findings in some way, compared with if it had been a pure sample from the mental health sector. Still, in exploratory studies like this, convenience samples can provide useful information. The main purpose of the present study was to investigate how interprofessional collaboration may be measured, not to generalize to a population of professionals working within mental health care.

Children with mental health problems are dependent on many persons, and it is our responsibility as professionals to investigate the best way to help these children and their families. One approach suggested in this article is to explore a method to measure how professionals perceive interprofessional collaboration. It is suggested that greater insight in how collaboration is perceived, may give new ways to evaluate collaboration processes, through research and to enhance service delivery and case work. Our main goal is to increase the quality of services for children and their families suffering from mental health problems.

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Appendix I
PINCOM -Q: collaboration with professionals from other services

Think about collaboration activities with professionals from other services (schools, school psychology services, child protection centre, primary health nurse and child psychiatric clinic) and consider the claims presented below. Please make a mark, by circling one of the numbers, to indicate your position (1=strongly agree, 2=moderately agree, 3=mildly agree, 4=neither agree nor disagree (neutral), 5=mildly disagree, 6=moderately disagree or 7=strongly disagree).

Individual aspects

	Strongly agree						Strongly disagree

C 1: I find working in interprofessional groups valuable............1 2 3 4 5 6 7
C 1: I get to use my creativity and imagination when I work in interprofessional groups 1 2 3 4 5 6 7
C 1: It is important to be personally engaged when collaborating in interprofessional groups 1 2 3 4 5 6 7
C 1: I experience personal growth when I work in interprofessional groups............1 2 3 4 5 6 7
C 2: I always have clear goals when I work interprofessionally............1 2 3 4 5 6 7
C 2: I experience that other professionals have expectations that are contradictory to mine
   when I work in interprofessional groups 1 2 3 4 5 6 7
C 2: My experience is that our roles are always clearly defined............1 2 3 4 5 6 7
C 2: I experience that my area of responsibility is clearly defined when I work in interprofessional groups......... 1 2 3 4 5 6 7
C 3: Some professionals act in ways that make interprofessional collaboration difficult............1 2 3 4 5 6 7
C 3: If some professionals had greater insight in their behaviour, collaboration would be easier..........1 2 3 4 5 6 7
C 3: Some professionals lack openness and do not participate much in interprofessional groups........1 2 3 4 5 6 7
C 3: Interprofessional collaboration calls for openness of mind and not all professionals are
   able to live up to that............1 2 3 4 5 6 7
C 4: Some professionals dominate the interprofessional meetings with their professional viewpoints.............. 1 2 3 4 5 6 7
C 4: Some professionals supply the premises in interprofessional groups............1 2 3 4 5 6 7
C 4: Sometimes I am not able to present my perspectives because other high status
   professionals talk all the time............1 2 3 4 5 6 7
C 4: Occasionally interprofessional groups do not work because some professionals
   dominate the meetings............1 2 3 4 5 6 7

Group aspects

C 5: I often experience that effective interprofessional groups have a clear and defined leader..........1 2 3 4 5 6 7
C 5: It is important that the group leader arrange the work in ways that help the
   group reach their goals............1 2 3 4 5 6 7
C 5: The group leader seldom influences what the other professionals do............1 2 3 4 5 6 7
C 5: I trust that the group leader will ensure the interest of the group............1 2 3 4 5 6 7
C 6: We almost always solve the defined problems in the interprofessional group............1 2 3 4 5 6 7
C 6: There are seldom collaboration problems in interprofessional groups............1 2 3 4 5 6 7
C 6: In most of the interprofessional groups I participate in, we agree about priorities............1 2 3 4 5 6 7
C 6: Professionals in interprofessional groups are often frustrated with each other............1 2 3 4 5 6 7
C 7: I get relevant feedback on my contributions in the interprofessional groups I participate in..........1 2 3 4 5 6 7
C 7: In the interprofessional groups I participate in, exchange of information is never a problem.........1 2 3 4 5 6 7
C 7: There is always good communication in interprofessional groups............1 2 3 4 5 6 7
C 7: Professionals are good at exchanging information with each other about how they work........... 1 2 3 4 5 6 7
C 8: I experience that I can get help and social support from the other professionals in the
   interprofessional groups I participate in............1 2 3 4 5 6 7
C 8: I find that other professionals in the interprofessional collabororation groups I
   participate in, are willing to listen to me if I have problems............1 2 3 4 5 6 7
C 8: I find that I am appreciated by other professionals in the interprofessional groups I participate in.............. 1 2 3 4 5 6 7
C 8: I have almost never found that other professionals do not understand what
   I am trying to express and/or report............ 1 2 3 4 5 6 7

Organizational aspects

C 9: It is common that interprofessional collaboration is highly valued............1 2 3 4 5 6 7
C 9: Interprofessional groups are composed of professionals that are strongly influenced
   by the organizational culture they belong to............1 2 3 4 5 6 7

Individual aspects	Strongly agree						Strongly disagree
C 9: The organizations are characterized by the wish to work interprofessionally	1	2	3	4	5	6	7
C 9: We (the employees) are encouraged to promote new ways of working in interprofessional groups	1	2	3	4	5	6	7
C 10: Interprofessional work is an area of priority in the other organizations	1	2	3	4	5	6	7
C 10: Interprofessional collaboration is well described in their plans	1	2	3	4	5	6	7
C 10: I am familiar with the plans of the other organizations	1	2	3	4	5	6	7
C 10: The other services have definite and clear aims regarding interprofessional collaboration	1	2	3	4	5	6	7
C 11: Laws and regulations are relatively well known by all the professionals in interprofessional groups	1	2	3	4	5	6	7
C 11: Everybody knows their area of responsibility	1	2	3	4	5	6	7
C 11: Everybody knows the area of responsibility of the other professionals	1	2	3	4	5	6	7
C 11: We need to inform each other about our area of responsibility	1	2	3	4	5	6	7
C 12: The needs of the clients are very important for how we work in interprofessional groups	1	2	3	4	5	6	7
C 12: Interprofessional groups exist because the state has decided that professionals should collaborate	1	2	3	4	5	6	7
C 12: Interprofessional groups exist because the clients want them	1	2	3	4	5	6	7
C 12: It is often difficult to get interprofessional groups to work well because professionals represent so many different interests	1	2	3	4	5	6	7

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