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Attributes of Interdisciplinary Research Teams: A Comprehensive Review of the Literature

Abstract

Purpose: To solve large complex health-related problems, there has been a progressive movement towards interdisciplinary research teams; however, there has been minimal investigation into the attributes of successful teams. The purpose of this literature review was to examine the attributes that are important for the effective functioning of these teams.

Method: Literature from medicine, nursing and psychology databases, published between 1990 and 2010, was reviewed.

Principal findings: Thematic organization of the findings identified seven attributes important to effective interdisciplinary research teams: team purpose, goals, leadership, communication, cohesion, mutual respect and reflection. These attributes are described in depth.

Conclusion: Identification of these attributes could form the basis of a new measure to monitor interdisciplinary research team effectiveness, identify weaknesses and promote team development.

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There has been a rapid proliferation of interdisciplinary research teams due to an increased need for contributions from different disciplines when solving large and complex health problems [1, 2]. As individuals rarely have the expertise needed to facilitate a multidimensional project or deliver a complete episode of inpatient care, the importance of interdisciplinary teams was recognized almost three decades ago [3]. A team is defined as a small group of people who have complementary skills and are committed to a common purpose for which they have shared responsibility [4]. Interdisciplinary research refers to the collaboration of researchers from various disciplines to solve a common problem [5]. This differs from multidisciplinary research where researchers of various disciplines work separately on different aspects of a broad problem [6]. Interdisciplinary research can also be distinguished from transdisciplinary research, where researchers assimilate disciplinary-specific theories and concepts to solve a problem, while minimizing the segregation of the various disciplines [7]. The rise of interdisciplinary research teams is due, not to a growing belief in heterogeneity, but rather to an increase in the scientific complexity of problems currently under study [8]. The complexity requires that scientists move out of the confines of their own discipline and into the realm of team science [9]. Interdisciplinarity is needed to effectively answer questions about causes and solutions to complex health problems [6 10].

When defining successful interdisciplinary teams, it is important to assess more than the technical skills of the individuals comprising the team, but rather consider the dynamics, such as conflict resolution and communication of team members [11]. By assessing the factors contributing to team dynamics, team effectiveness can be further understood. Given the recent investments in interdisciplinary research teams, it is important to understand the attributes that may predict success and failure of these teams [12]. Assessing interdisciplinary research teams would allow the team to target specific areas needing improvement and, consequently, move toward increased effectiveness and a greater understanding of interdisciplinary teams. While there is some information about the attributes of effective interdisciplinary health care teams [13], there is a limited understanding of these characteristics in interdisciplinary research teams.

Previous studies, including those of Mickan and Rodger [14] and Kvarnstrom [15], have evaluated the factors necessary for interprofessional teams in clinical health care settings. Such factors include purpose, goals, leadership, communication, cohesion and mutual respect [14]. Communication and well-established connections among team members are vital to team

productivity, promoting easy sharing of information and building trust among the group; thus, greater cohesion, stability and, ultimately, productivity may result from positive team interactions [16]. Minimal literature regarding the attributes of interdisciplinary research teams is available. The aim of this study was to conduct a comprehensive review of the literature of the attributes of effective interdisciplinary research teams.

Materials and Methods

A search of the literature from medicine, psychology and nursing was conducted to identify studies and reviews that assessed interdisciplinary teamwork in healthcare research published in English from 1990 to 2010. The electronic databases MEDLINE, PsycINFO and CINAHL Plus were searched with the keywords in the following table.

TABLE 1. Search Concepts

Search Concept A: (interdisciplinary research team)	Search Concept B: (effective)
interdisciplinary research team	efficient
multidisciplinary research team	effectiveness
transdisciplinary research team inter-disciplinary team	effective
multidisciplinary team	cooperative behaviour
transdisciplinary team	group processes
patient care team	team effectiveness
health care team	
interprofessional relations	

Keywords in each Search Concept were first combined with the Boolean operator “or”. Then, Search Concept A was combined with Search Concept B with the Boolean operator “and”. MEDLINE, PsycINFO and CINAHL Plus retrieved 667, 1143 and 135 titles and abstracts, respectively. Articles were selected for their relevance to team attributes and strength, and the full text articles were retrieved. Hand-searching of the reference lists from these articles rendered further articles dating back to 1985, giving a total of 41 articles. Relevant articles were entered into EndNote 11. Using a data extraction sheet designed for this review, the articles were read and analysed for themes or attributes. Given the lack of literature about interdisciplinary research teams, articles addressing concepts is interprofessional health care teams were included. From our analysis of the literature, seven attributes (team purpose, goals, leadership, communication, cohesion, mutual respect and reflection), which may contribute to successful interdisciplinary research teams, were identified.

Results

Team Purpose

Through its construction, portrayal and comprehension, the team's purpose is able to influence the efficacy and maturity of the team. Effective teams have a progressive, well-defined and consensual team purpose [14 17]. The development of a well-defined team purpose allows members to develop a genuine interest in the project and remain motivated because they recognize the importance of individual expertise [14 18]. Consensus regarding team purpose has created more positive interactions among team members leading to a more stable and developed team [19]. Similarly, in 'developed' teams, consensus and cohesion is fostered among members as they define their mission [20]. Additionally, the efficiency of interdisciplinary research teams is strengthened when the team purpose has an impact on other individuals in society [21]. The extension of their expertise beyond the interdisciplinary group is deemed motivating by both patients and target populations of the interprofessional health care team [21]. Newcomers add to the team purpose by stimulating intellectual curiosity and reducing the rigidity associated with discipline-specific practices [22].

Goals

Goals, as described by Mickan and Rodger [14], are the intermediary link among the team purpose and result. Effective interdisciplinary teams require clearly measurable goals that are set collaboratively [14]. Comparable to the team purpose, consensus of team goals increases efficacy by increasing the commitment of the team members [23]. High levels of commitment allow team members to thrive in the face of challenges, rather than labelling challenges as stressful and thus hindering team achievement. Furthermore, highly committed team members are willing to make personal sacrifices to benefit the team goal [24]. Clear, measurable goals focus the team members' strategies for achievement and long-term planning [4 14]. Also, clear goals promote open communication within the team, which contributes to team strength and cohesion and, ultimately, efficacy [3].

Leadership

Although interdisciplinary team hierarchies are not rigid entities, successful teams generally have a stable core [18]. Leaders must have credibility so they are respected, but also have the skills to mediate personalities, goals and theoretical perspectives [6]. Effective leadership results in the maintenance of efficiency and motivation through good feedback and coaching

of team members and subgroups [14 24]. These traits reflect transformational leadership, whereby leaders give personal attention to the team members and emphasize task importance and expectations, which instils a sense of mission and pride [25]. This differs from transactional leadership whereby leaders promise reward for effort and take corrective action when standards are not met by team members [25]. Designated team leaders and shared leadership have both been shown to be large contributors to interdisciplinary team effectiveness. Valuable leaders easily switch between leader and follower roles as certain issues often require the expertise of fellow team members for successful project development [18]. Maturing teams often share leadership roles depending on the expertise needed to address the problem at hand [20 26 27]. Operationalizing shared leadership allows for the wide diversity of expertise within interdisciplinary teams to be constructively exploited. Similarly, Given and Simmons [27] have suggested that "acts" of leadership allow more effective interdisciplinary team functioning than having one identified leader. Through shared leadership, all members accept responsibility for the task, which improves cohesion among colleagues [23].

Communication

Communication is a fundamental characteristic of effective interdisciplinary teams [12]. Exchanging information and ideas allows team members to share their expertise with one another [28]. Increased interactions typically improve trust among team members, permitting them to feel comfortable contributing insights and concerns without fear of repercussion [11]. Trust is therefore important to effective communication, as it increases the willingness of the members to share their expertise and skills [24 27]. Integration of knowledge through communication is beneficial to all members as it prevents poor dynamics and improves team consensus [15 29]. Communication also increases attention to others, improves member participation, and sustains individual awareness of project status [12 18]. The Social Exchange Theory has demonstrated that, in social interaction, the behaviour of one individual reinforces the behaviour of another, who, in return, reinforces the behaviour of the first individual, and the cycle continues [30]. Through this process, communication within a team is vital as it increases cohesiveness and drives team strength. Thus, there must be informal, free exchange of accurate information to ensure healthy team dynamics and equality of power among those who possess the information and those who do not [27].

Flexibility of communication methods assists in the transfer of information as it incorporates the diversity of the team members' interpersonal skills and preferred communication

styles [14]. Various communication methods include telephone conversations, emails and face-to-face meetings. The latter, found most commonly in professional activities such as meetings and retreats, is a powerful contributor to team dynamics and cohesion [16].

Cohesion

Cohesion is regarded with high importance because good relationships promote coordination and appropriate project evolution [6 12]. Cohesion is defined as the camaraderie established in teams that have worked together over time due to familiarity among members [14]. High levels of cohesion are seen in mature teams specifically in the performing, production and solidification stages [26, 32]. This cohesion promotes insight, hunches, risk-taking and experimentation, which are important aspects of scientific investigation [6]. Cohesion has been included in team assessment tests such as the Bendaly Team Fitness Test [11]. This assessment evaluates team strength in relation to five critical elements including shared leadership, group work skills, climate, cohesiveness and change compatibility [11]. Cohesion is negatively correlated with member turnover. With high levels of turnover, ideas generated by new members are asynchronous with established group goals and previously recognized ideas [14]. The decreased familiarity within a group that occurs with turnover appears to contribute to reduced longevity of that group [32]. Furthermore, turnover causes team productivity to decline as maximum efficiency is achieved through experiences gained from previously working together [12, 33]. Giacomini [22] has stated that constant turnover results in a destruction of interdisciplinary work in teams that have just begun to “gel” (p. 181). As indicated earlier, knowledge integration through communication is vital in an interdisciplinary team to incorporate the expertise of all individuals [29]. This collaborative learning requires familiarity, trust and respect among members, and demonstrates the importance of sustained relationships to intellectual capital [7 35]. It is important to note that all aspects of cohesion are increased in relation to geographic proximity [12, 22].

Various suggestions have been made for increasing interdisciplinary team cohesion. Professional activities, such as meetings and retreats, enhance cohesion by increasing interactions among team members. Professional connections and cohesion are also fostered through social activities including short coffee breaks and larger social events. When cohesion increases, comfort among members within the team develops and personal conversations arise; this includes the sharing of celebratory or grieving life events, such as birthdays and deaths [16]. The sharing of life events, that can occur with frequent

interactions among colleagues, indicates high levels of trust [11].

Mutual Respect

Mutual respect, which is necessary for interdisciplinary team effectiveness, is defined as being open to the talents and beliefs of all individuals in addition to understanding the value of your own contributions [14 29]. There is a need for professionals to understand the potential contributions of their colleagues and to work collaboratively with them to effectively integrate the contributions and expertise of all members [14 19]. Mutual respect is fostered by team members who are willing to “think outside the box” (p. S20), and are open to alternative approaches and to the opinions of other members [18]. Mutual respect adds to team effectiveness by allowing team members to express ideas without the worry of ridicule or reprisal [23]. Supportive team members increase group efficacy by sharing more information, solving more problems and increasing collaborative assistance [24].

Reflection

Reflection ranges from thinking of an event, to increased awareness of feelings, values, and actions, to considering various solutions to a problem [35]. Reflection is not one of the six characteristics of the Healthy Teams Model described by Mickan and Rodger [14], but is necessary for the understanding of the mechanisms of a team and can help to account for professional socialization patterns. Through critical reflection, teams are able to understand areas of strengths as well as opportunities for improvement, allowing them to target specific areas for team enhancement [15]. Without team reflection, learning within the team is obstructed [15].

Intrapersonal reflection, which also contributes to team efficiency, involves the self-assessment of personality type, learning style preferences, conflict management skills and leadership ability. The assessment of these characteristics can be done through multiple tests, including the Myers-Briggs Type Indicator (MBTI) [36], Kolb Learning Style Inventory (LSI) [38], Conflict Mode Instrument (CMI) [39] and the Bolman and Deal Leadership Orientation Instrument (LOI) [39]. Utilization of these instruments amplifies self-perception, allowing individuals to further understand their potential contributions to the group, thus enhancing their role as a team member. By sharing the outcomes of these assessments, important insight is gained into the strengths, behaviours, personalities and leadership styles of all team members, and, therefore, contributes to interpersonal reflection [40]. Intrapersonal re-

reflection has been related to enhanced professional skills including effective listening and argument clarification [35].

In summary, the first six attributes (team purpose, goals, leadership, communication, cohesion, mutual respect and reflection) of an interdisciplinary team are consistent with the Healthy Teams Model [14], and are well supported in the literature. Reflection is a newly identified attribute that appears to be relevant to the effectiveness of interdisciplinary research teams.

Discussion

The increase in interdisciplinary research teams has been significant; however, there are limited studies focusing on the attributes necessary for these teams to function effectively. Through this review of the literature, seven attributes were found to be of significance for development of a successful interdisciplinary research team. These attributes included team purpose, goals, leadership, communication, cohesion, mutual respect and reflection. The attributes focus on the relational aspect of the team, rather than individual expertise and contributions. By strengthening these attributes, individual members may be more successful in contributing their expertise and increase overall team effectiveness.

The concepts identified in this review of the literature may aid in the development of an instrument to assess and monitor characteristics of effective interdisciplinary research teams. Such an instrument has the potential to provide information about interdisciplinary team attributes, and to support team self-evaluation by identifying areas of strength and weakness. Some instruments have been constructed to measure factors contributing to interdisciplinary team effectiveness and level of productivity; however, none of these measures have employed a theoretical framework to organize the concepts being assessed, nor have there been any psychometric evaluation of these measures. A reliable and valid measure of the attributes of interdisciplinary research teams would enable a team to focus on specific areas of improvement, leading to greater productivity and maturity of their team.

Summary

In summary, there has been a significant increase in the call for interdisciplinary research teams to solve large, complex health problems; however, limited attention has been given to understanding which particular attributes promote interdisciplinary team effectiveness. Without this information teams are unaware of ways in which they could improve their productivity. Given the proliferation of interdisciplinary research teams, the

ability to monitor their attributes is critical. This literature review provides the foundation for promoting effective interdisciplinary team productivity by identifying the key attributes of success.

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