

Improving emotional intelligence: A systematic review of existing work and future challenges

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Abstract

Emotional intelligence (EI) can be defined as the ability to identify, express, understand, manage, and use emotions. EI has been shown to have an important impact on health, relationships, and work/academic performance. In this paper, we present a systematic review of 46 EI intervention studies on adult populations in order to assess their outcomes. Overall, these findings provide some support for the efficacy of EI programs. However, important limitations in most of the studies restrict the generalizability of their results. We discuss the contributions and limitations of these studies and make recommendations for the development and implementation of future interventions.

Keywords: emotional intelligence, emotions, training, review

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Introduction

The ability to identify, express, understand, manage, and use emotions is known as emotional intelligence (EI; Mayer & Salovey, 1997; Petrides & Furnham, 2003). There is strong evidence that a high level of EI predicts better psychological and physical health (Martins, Ramalho, & Morin, 2010; Schutte, Malouff, Thorsteinsson, Bhullar, & Rooke, 2007), is related to better social and intimate relationships (Lopes et al., 2004; Lopes, Salovey, Côté, & Beers, 2005), and plays an important role in outcomes related to work (Daus & Ashkanasy, 2005; Joseph & Newman, 2010; Newman, Joseph, & MacCann, 2010; O'Boyle Jr, Humphrey, Pollack, Hawver, & Story, 2011; Van Rooy & Viswesvaran, 2004; Van Rooy, Viswesvaran, & Pluta, 2005), and academic achievements (Hogan et al., 2010; Jaeger, 2003; Marquez, Martin, & Brackett, 2006). The recent popularity of EI and its influence on various aspects of life has inspired a profusion of EI interventions (Daus & Cage, 2008). A systematic review of the existing research is important as it will allow us to understand the methodological shortcomings of previous emotional intelligence programs, thereby allowing us to improve EI protocols. In the first part of this paper we will explore the main professional fields that are interested in EI training. In the second, we will discuss the findings of previous research, highlight some of their limitations, and conclude with recommendations for the development of future interventions.

Studies on the perceived importance of EI training in different environments

The first domain that has focused on improving EI in adults is that of organizational leadership and performance. This is because EI has been shown to play a role in effective leadership (Côté & Miners, 2006; Rosete & Ciarrochi, 2005; Sy, Tram, & O'Hara, 2006) and professional success (Côté, Gyurak, & Levenson, 2010). Since then, EI has also entered into the curriculum of many other sectors. One such sector is that of medical education: many of the core

competencies of medical professionals are related to interpersonal skills associated with patient interaction (e.g., empathic communication; Grewal & Davidson, 2008; Ruckdeschel & Van Haitsma, 2004; Evans & Allen, 2002), or intrapersonal skills involved in managing delicate and stressful situations (e.g., emotion regulation). EI is targeted as a key ability in a medical resident's curricula (Arora et al., 2010; Taylor, Farver, & Stoller, 2011). For example, EI appears to be important in training obstetricians and gynaecologists to improve the patient-doctor relationship, and to increase patient satisfaction (Pilkington, Hart, & Bundy, 2012).

In the public sector, EI is related to the efficiency and social skills of public managers in local governments (Berman & West, 2008). EI also appears to be an important skill in the training of academics, as it underlies academic interpersonal and intrapersonal capabilities critical to teaching and interacting with students (Oberst, Gallifa, Farriols, & Vilaregut, 2009). In the judicial sector, EI abilities are considered to be crucial for effectively representing a client, due to the importance of developing trust, cooperation, and collaboration (Reilly, 2005). Ultimately, EI is seen as being integral to numerous professions, which has led to an increase in research examining EI enhancement. In the next section, we will critically review the existing studies on EI improvement.

A systematic review of EI training studies

The purpose of our systematic review of EI research is to answer the following questions:

- Is there a systematic effect of EI interventions on increasing EI?
- What are the consequences/correlates of any possible improvement?
- What are the limitations of these studies?
- What recommendations can be made?

Method

Literature search

Relevant studies published until June 2016 were identified via the Scopus and Science Direct online databases using combinations of the following key words: *emotional intelligence*, *emotional competence* and *intervention*, *training*, *improving*, *improvement*, *change*, *development* and *increase*. Research on other sources (e.g., Google Scholar) and the bibliography of the papers obtained revealed additional sources. We used the PRISMA Checklist as a guideline for a systematic and comprehensive review (Moher, Liberati, Tetzlaff, & Altman, 2009). The Flow Diagram (Figure 1) illustrates the selection process.

Insert Figure 1 about here.

There were few eligibility criteria, since the literature on EI improvement is scarce. Studies were included in the review if they met the following criteria:

1. The study must be presented as an intervention testing increases in EI as a primary outcome, and must contain at least one EI measure as the dependent variable.
2. The intervention must involve face-to-face training with a teacher/instructor (not just a software or an internet device).
3. The study should aim at improving EI as a whole, rather than just one dimension (e.g.; facial emotion recognition).
4. The study must be published in English in an indexed peer-reviewed journal.
5. The sample must be comprised of adults (i.e. all child or adolescents studies were excluded).

A total of 1135 papers were first identified. After a first screening, we excluded 1001 studies that did not obviously fit with our review (e.g., because they were not about EI interventions). Of the 134 studies remaining, 88 were excluded because of duplicates and

because: a) the rationale of the intervention was based on a construct different to that of EI (e.g. mindfulness, meditation), b) the intervention was published in another language (e.g., the study of Lee & Hu 2014, which was published in Korean). Several papers were excluded because they did not report an intervention study, or they did not have an EI measure as a dependent variable (e.g.; Yilmaz, 2009, which examined the effect of an EI training on anger rather than an actual EI measure). Some studies were excluded because there was no actual EI intervention: e.g., in Dulewicz and Higgs's paper (2004), studies 2 and 3 were excluded because EI was measured twice without an intervention between the two measurements (in one study the authors reported a continuous improvement initiative and the other was in the context of a yacht race). We excluded proceedings of conferences or conference papers (e.g., Murray, Jordan, & Ashkanasy, 2006). In some cases there were two papers that reported different aspects of the same study (Beigi & Shirmohammadi, 2011; Dadehbeigi & Shirmohammadi, 2010; Hodzic, Ripoll, Bernal, & Zenasni, 2015; Hodzic, Ripoll, Lira, & Zenasni, 2015). In such cases, both references are reported in the same cell (see Table 1). Lastly, the N was not taken into account as in the exclusion criteria. Hence, some studies could be underpowered.

Data recorded and presentation of studies

A total of 46 articles met the inclusion criteria. The details of these studies are presented in Table 1. For each study, basic information is provided regarding sample characteristics, design (i.e., whether there was a control group), modules, intervention content, the type of EI dependent measure used, whether there was a follow-up, correlates (other than EI) and whether there were significant results. We used numbers to refer to these articles in the text. Each paper and its number can be found in Table 1 (refer to the supplementary material).

Results

The analysis of the EI development literature shows that the number of studies has

increased in the last few years: of the 46 studies we unearthed, 30 were published in the last 6 years. Overall, 39 out of 46 studies report significant results, on at least one dimension of an EI measure. That being, the proportion of significant results does not give an accurate overview of the field. We will now review the strengths and weaknesses of the studies and start by addressing an important point, that is, the question of the definitions of EI itself.

The question of whether EI is an ability (Salovey & Grewal, 2005) or rather an emotional personality trait (Petrides, Pita, & Kokkinaki, 2007) is an ongoing debate in the field of EI. These different viewpoints have consequences for the measurement of EI: ability would be measured with a performance-like test (e.g., MSCEIT; the Mayer Salovey Caruso Emotional Intelligence Test; Salovey & Grewal, 2005), a trait would be measured with a questionnaire, of which there are many (e.g., the TEIQue; Trait Emotional Intelligence Questionnaire; Petrides & Furnham, 2003; or the EQ-i; Bar-On Emotional Intelligence Inventory; Bar-On, Maree & Elias, 2007).

Among all studies, nine measured EI with an ability test (i.e., a performance measure such as the MSCEIT) and 37 used trait-like measures (i.e., self-reported measures such as the EQ-i or the TEIQue). Of the nine studies that used the MSCEIT, two studies (12 & 37, reported significant increases for two subdimensions of the MSCEIT. The results of two other studies (7 & 8) were significant only for one subdimension of the MSCEIT (subdimensions 2 and 3, respectively). One study (11), a randomized study, showed meaningful results on the total EI score from pre- to post- training (i.e., an increase of around 15% in EI). However, this study did not measure any outcomes of increased EI, nor did it feature a follow-up assessment. Another (study 9) reported negative results: levels of EI actually decreased following the intervention. In study 10 the level of attrition was too substantial for pre- to post- test comparisons while studies 29 & 42 had no significant results related to EI ($p > .05$). These mixed results suggest that, in the case of ability EI measures, the field of EI is still in need of more rigorous, controlled studies

before conclusions can be drawn about the positive effects of these interventions.

Of the 37 studies using trait-like measures, the measure that was most used was the EQ-i (14 studies, 30%). Of the 14 studies using the EQ-i, 13 reported a significant increase in the total EI score, only one did not report a significant result at all (Muyia & Kacirek, 2009). Of the 23 other studies, only four did not reported a significant EI increase. See Table 1 column j.

It is important to note that using a measure of EI does not imply using a conceptual model for the intervention. Moreover, the studies we report on used more than 20 different measures, and since it would be inappropriate to combine results from different measures when it is not clear that they measure exactly the same construct, our conclusions will therefore have to be tentative. Another important point is that most of the interventions we gathered did not provide the necessary information to evaluate their possible conceptual model; therefore the results reported in the next sections combine studies using different EI measures. Because EI is supposed to increase academic performance, work-performance, relationship outcomes (e.g, the quality of relationships), mental and physical health, we will now review the studies in relation to these outcomes.

Work-related outcomes

As noted in the introduction (p.3), EI is associated with many important work-related outcomes such as increased management skills and work-satisfaction performance. Of the eleven studies (n° 2, 8, 13, 16, 18, 21 25, 36, 39, 40, 41) targeting work related outcomes, eight reported significant results. There were improvements in teamwork, conflict management (study 8), patient satisfaction (study 13), coaching skills (study 18), employability and reemployment (study 21), workplace incivility (study 25), institutional climate (study 36), and job satisfaction (study 40). Three studies assessed work performance (studies 16, 39 and 40) and only one reported significant results (an increase in sales, study 16). Given that the link between EI and

performance remains unclear, further investigation is called for.

Academic related outcomes

In the two studies assessing teaching performance, there was no significant result related to teaching efficacy (study 41) or teachers' empathy (study 20). The small number of studies and mixed results point to the need for additional research in these fields.

Psychological and physical health

As highlighted by numerous studies and meta-analyses, EI is related to psychological and physical health (Martins, Ramalho, & Morin, 2010; Mikolajczak, Petrides, Coumans, & Luminet, 2009). Fourteen studies (21, 23, 24, 25, 26, 33, 34, 35, 36, 38, 39, 41, 43, 44 and 46) assessed changes in psychological health and well-being, and all of them (with the exception of study 41 on the psychological health of candidate teachers and study 44 on the impact of emotional writing on life satisfaction) reported significant positive results. Three studies assessed the effect of an EI increase on physical health indicators, two on somatic complaints (26 and 34) and one (study 24) on HbA1c levels, a glycemic indicator in diabetes. All these studies found improvements in the EI intervention condition. These promising findings suggest that increasing various aspects of EI often has meaningful results on psychological health and that the effects of EI on physical health are worth further investigation.

Relationship related outcomes

EI is also thought to impact social relationships (Côté, DeCelles, McCarthy, van Kleef, & Hideg, 2011), but only three studies (26, 34, 42) have investigated – with success – the impact of EI improvement on the quality of relationships. Given the importance of social relationships and social support in well-being, more research in this area would be beneficial.

Conclusion

Taken together, these results suggest that groups receiving EI interventions improved

compared to control groups. This is in line with the results of a recent meta-analysis, based on the results of 24 studies and 28 samples, that concluded that EI trainings are effective interventions that improves durably EI (Hodzic, Scharfen, Ripoll, & Holling, in press). Nevertheless, it is important to keep in mind that the field of EI interventions is relatively new and heterogeneous, which makes comparisons between studies difficult. As an example, more than 20 different EI measures have been used across studies (see Table 1).

Limitations and recommendations related to research design characteristics

So far it appears that many studies lack a clear theoretical or methodological rationale and do not report information concerning the training content, or include flaws related to some parts of the research design. We will now focus our discussion on these limitations and on how to improve the process of developing more useful and effective EI interventions, after which we will highlight some future research directions.

Control group

Control groups are critical to evaluating interventions because they allow us to exclude the possibility that the effect of the intervention is merely due to the group setting and that the very same effects would have been observed with any group activity (e.g., a “Hawthorne effect”, or a placebo effect). Active control or waiting list groups are preferable because they also allow motivation biases to be controlled for: participants in the intervention group may have a greater motivation to change than participants of a no-waiting list control group, which could impact the outcome. Two thirds of the studies reviewed (29) included a control group but these control groups were inactive control groups in most cases (80%). Only 5 studies (studies 17, 21, 24, 26, 43) used a waiting list control group, 5 studies (studies 18, 25, 34, 37, 44) used an active control group (e.g., drama improvisation). We recommend the use of active control groups, that is, groups that engage in another activity comparable in duration to that of the EI intervention (e.g., a

relaxation training group that runs for the same duration).

As an example of good practice, Nelis et al. (2011) assessed an intervention with an EI intervention group and two control groups: one inactive control group and one active control (drama improvisation) group. While the EI intervention group showed the greatest improvement in psychological health, the active control group also showed a significant improvement, whereas the inactive control group showed no change.

Subject allocation

Only ten studies (studies 5, 11, 21, 23, 24, 25, 38, 43, 44, 46) used a randomized controlled design. Ideally, participants would be randomized in order to avoid motivation or demand effects.

Long-term assessment

There are several reasons why the long-term effects of EI interventions should be assessed. First, because time has an impact on learning retention (Saks & Belcourt, 2006): long-term assessment is essential to assess sustained learning transfer and the acquisition of EI competencies. Second, trait-related outcomes are relatively stable and may take time to change. Some of the studies reported here show that EI improvements may not be detectable immediately after an intervention (Abe et al., 2013; Clarke, 2010b; Gorgas et al., 2013) because they may occur only after a certain time period (e.g., after 6 months). In a recent paper, Nelis et al. (2011) reported that a 6-month follow-up revealed changes in personality traits that did not manifest at the short term, including a significant decrease in neuroticism and a significant increase in agreeableness. These results suggest that it may be important to have follow-up assessments in order to evaluate changes that take time to manifest. On the other hand, any results that occur shortly after an intervention may just be due to people's increased knowledge of EI from the intervention, which may not translate into abilities or behaviors that would last for the long term.

Only about a third of the studies (studies 1, 8, 13, 14, 17, 21, 24, 26, 32, 33, 39, 40, 43) assessed the long-term outcomes of the interventions (i.e., at a minimum follow-up period of 6 months). In several studies, the effects of the intervention were assessed only immediately after the intervention. We recommend long term (and ideally multiple) assessments in order to allow changes in EI to be detected and to verify that they are maintained for a long period of time. As an example of good practice, in their EI intervention study for diabetes patients, Karahan & Yalcin (2009) assessed the outcomes of their intervention at three time points: immediately after the intervention, 3 months later, and 6 months later.

Intervention content.

In several studies, either the intervention assessed was not empirically designed to improve EI or no information about the intervention content was provided. Out of the 46 studies reviewed, 28 reported a primary EI intervention (studies 2, 4, 8, 11, 12, 13, 14, 15, 16, 17, 20, 21, 23, 24, 26, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 45, 46). In 8 studies (studies 3, 6, 18, 19, 22, 27, 28, 31) the intervention concerned leadership, management or coaching. In 5 other studies (studies 5, 7, 9, 10, 30) the intervention was related to team or peer learning, feedback or process design. Two studies (25 & 44) were based on a writing paradigm (writing about one's emotional experiences). One study (1) was a mental health intervention (consisting of lectures and discussions on grief and mental health). Lastly, study 29 assessed a "ropes and challenges" intervention. Results show that interventions that are not specifically EI training interventions such as peer sessions (Codier, Kamikawa, & Kooker, 2011), check-in rounds (Codier, Freitas, & Muneno, 2013) or ropes and challenges (Meyer, Fletcher, & Parker, 2004) have less impact than a relatively short (2.5 days on average, plus a follow-up) and specifically EI-based intervention (e.g., Nelis & al., 2011, Slaski & Cartwright, 2003).

Among the 25 studies that claimed EI based content, only five (24, 26, 33, 34, 43) offered

a detailed summary of the intervention. The use of empirically based EI specific interventions would help not only the dissemination of effective tools, but would also open the possibility to better replicate, assess, and understand the effect of these interventions. Therefore, given the variety of interventions and the lack of theoretical rationales that could have guided their elaboration, we recommend the development of interventions that would ideally be: 1) Specifically EI-based 2) Constructed according to a specific, clear and well-documented conceptual framework, and 3) Using exercises that are based on scientific evidence. We also recommend the publication of more detailed training protocols. An example of good practice comes from a Karahan and Yalcin's (2009) intervention study (study 24). In their paper, there is a two-page table with the aim, theme and activities of the 12 EI modules of their intervention. In the case of organizations that already utilize EI concepts, we recommend that tailored interventions should be designed that are related to specific performance outcomes.

EI and EI correlate measures

There were many different EI measures used in the 46 studies we reported. Overall, 37 used a self-report measure, 6 used both self and peer report measures, and 9 studies used an ability measure (the MSCEIT). Only 10 studies used multiple EI measures. We recommend using at least self-report and peer report measures or self-report and ability measures and to assess reliability between measures in order to avoid relying only on an individual self-reported assessment of EI. For example, Gignac et al. (2012) used a self-report and 360° measure of EI (study 16), and in study 34, Nelis et al. (2011) used self-report and peer reported trait EI measures and a vignette-based measure of emotion regulation (ERP-R).

Multisource information about the possible benefits of EI improvement is also important to minimize problems associated with self-report data. An example of a well-designed intervention study in the workplace context is from Slaski and Cartwright (2003). This study used

informant-rated assessments of performance (the line manager's rating on 16 organizational performance factors) in conjunction with self-report measures of psychological health and perceived stress.

Biological and behavioral indicators

Objective indicators as behavioral or biological measures are necessary in order to demonstrate the potential benefits of EI interventions in a robust way. Two studies have used biological markers: Study 24 used levels of hemoglobin HbA1c (Karahan & Yalcin, 2009), which is related to diabetes, and study 26 used levels of cortisol (Kotsou, Nelis, Gregoire, & Mikolajczak, 2011), which is related to stress. Related to behavioral measures, two studies can serve as good examples. Study 21 (Hodzic, Ripoll, Lira, et al., 2015) combined the assessment of reemployment self-report measures and real reemployment rate one year after the intervention and showed that the average unemployment delay was shorter for the EI intervention participants, compared to the control group. The other study, study 34 (Nelis, Kotsou, et al., 2011), used an in-basket situation exercise (participants were given a problem that they needed to solve and were recorded during the process), with independent judges assessing participants' employability on a behavioral measure, and showed an increase of employability in the intervention group.

Sample/participants selection

The vast majority of the studies reviewed here were conducted on well-educated people. Twenty studies were conducted with a student sample (MBA students, college students or medical students), seven studies with managers or sales representatives, five studies with employees (teachers, banking sector employees or other working adults), seven studies were conducted on medical staff, three on patients, one on members of a sports organization (coaches, club directors) and one on cricket players. In order to ensure the generalizability of the results, it is important to conduct studies on samples representative of the general population or on

specifically targeted samples (clinical samples). As an example, for her study on unemployment, Hodzic (2015) recruited a community sample of 78 non-working adults.

Limitations and recommendations related to research reporting

Research reporting quality is necessary in order to ensure its replicability. In this regard, many studies fail to report important information. Some of them lacked of important elements such as information about the sample and inferential statistics on the outcomes. As an example, in one study (study 10), the EI pre-post scores declined, but the authors nevertheless stated that the study provided descriptive and anecdotal evidence for a positive effect of the intervention. In order to clarify the real effect of EI, future investigations should be more rigorous in their research reporting. For instance, we recommend the use of tools designed for reporting trials (Luce et al., 2009) such as the CONSORT checklist (Merrick et al., 2008), to ensure common standards in designing and reporting studies. The CONSORT checklist is an evidence-based set of recommendations for reporting randomized trials and interventions (<http://www.consort-statement.org/>).

Future directions

Effect of the participant characteristics

In one study neither gender, age nor cognitive abilities were related to EI improvement (Kotsou et al., 2011). However, it must be noted that correlational studies have found that the development of EI is related to age and gender (Cabello, Navarro Bravo, Latorre, Fernández-Berrocal; 2014; Joseph, D. L., & Newman, D. A.; 2010). This suggests that such potential moderators may still warrant future investigation. Nor is a minimum level of baseline EI required to obtain improvements (Nelis et al., 2009). However, lower levels of baseline EI correspond to greater improvements (Kotsou et al., 2011); participants with a high initial level of EI may not even experience significant changes (Kruml & Yockey, 2011). The same trend has been reported

in a study looking at the effects of an EI intervention on emotional writing (Kirk et al., 2011), which showed that only participants who were initially low or moderate in self-efficacy increased significantly in self-efficacy at post test. Ethnic origins and cultural differences could also impact EI improvement. In countries where immigration is prevalent, such as in the US and most European countries, participants could be from very different origins (e.g., Asian, African), which is often not reported. Because cultural contexts affect emotion regulation processes (Butler et al., 2007), for example due to various cultural emotional norms (Leys, Licata, Marchal, & Bernard, 2011), it may be worth investigating to what extent or under which circumstances emotional intelligence processes may produce differential outcomes based on cultural context. Potential moderating effects of participant characteristics still need to be investigated in order to better understand the conditions of emotional change on the groups/subgroups that would benefit the most from these interventions.

Effect of the intervention format

Is there a differential effect of different training settings or duration on EI improvement? Several scholars (Kotsou et al., 2011; Nelis et al., 2011) have reported consistent results with different intervention formats (3 days or 2.5 days with one month follow-up or 6 weekly 3-hour sessions). Kruml and Yockey (2011) assessed whether the way in which the training was delivered (face-to-face and hybrid online and face-to-face) and training length (between a 7-week and 16-week curriculum) would lead to different outcomes. They reported no differences in the effectiveness between the different settings. While comparing a long-term (13-week, spaced learning; n=23) with a short-term (two-day, block intensive, n=20) coaching skills training program, Grant (2007) reported that EI increased only with the long-term intervention. Therefore, EI improvement may occur only after a sustained effort. Is follow-up, whether face-to-face or online, necessary to ensure sustained learning transfer? Further investigation is needed to answer

this question.

Effect of expectations

Active participation may also be a moderator of the efficacy of an intervention: a recent study (Clarke, 2010a) that assessed the effects of attending a one-day EI training session followed by participation in team-based learning reported that there was a positive effect only for those participating more intensively in team learning. Because participation may be linked to motivation and expectations, controlling for these features in future research could provide useful information.

Clinical applications

Previous correlational studies have shown an important relationship between EI and both psychological and physical health (Martins et al., 2010). Intervention studies offer preliminary results suggest that improving EI can improve psychological and physical health such as type 2 diabetes (Karahana & Yalcin, 2009) and depression (Jahangard et al., 2012). However, it is important to note that due to the very small number of these studies, these results should be replicated and extended to other pathologies. Given that EI is known to moderate both subjective (Mikolajczak, Petrides, Coumans, & Luminet, 2009) and endocrine responses to stressors (Mikolajczak, Roy, Luminet, Fillée, & de Timary, 2007), EI interventions may be tested as a tool to prevent and treat work burnout and chronic stress. EI may also be applied to more specific domains, such as psychosomatic difficulties (e.g., migraines), and alcoholism. For example, as low EI is related to alcohol craving after drinking withdrawal (de Sousa Uva et al., 2010), EI interventions may be tested to prevent relapse for alcohol-related problems.

Conclusion

Findings from this review suggest that it is possible to improve various aspects of EI competencies in a way that often benefits psychological health. However, there is a need for

additional research in order to confirm that EI interventions improve work and academic performance. More research is also needed in order to better understand the potential mediators and moderators of such improvements. Our hope is that the current review allows researchers to now have not only a broad and clear view of the field of EI interventions, but also useful information to create theoretically and methodologically well-designed interventions that will advance this field of research. Our paper also outlines the possible promises of EI interventions in clinical settings, and we hope that this will motivate researchers to work in this context, further advancing our understanding on how emotional competencies could help relieve suffering and increase well-being.

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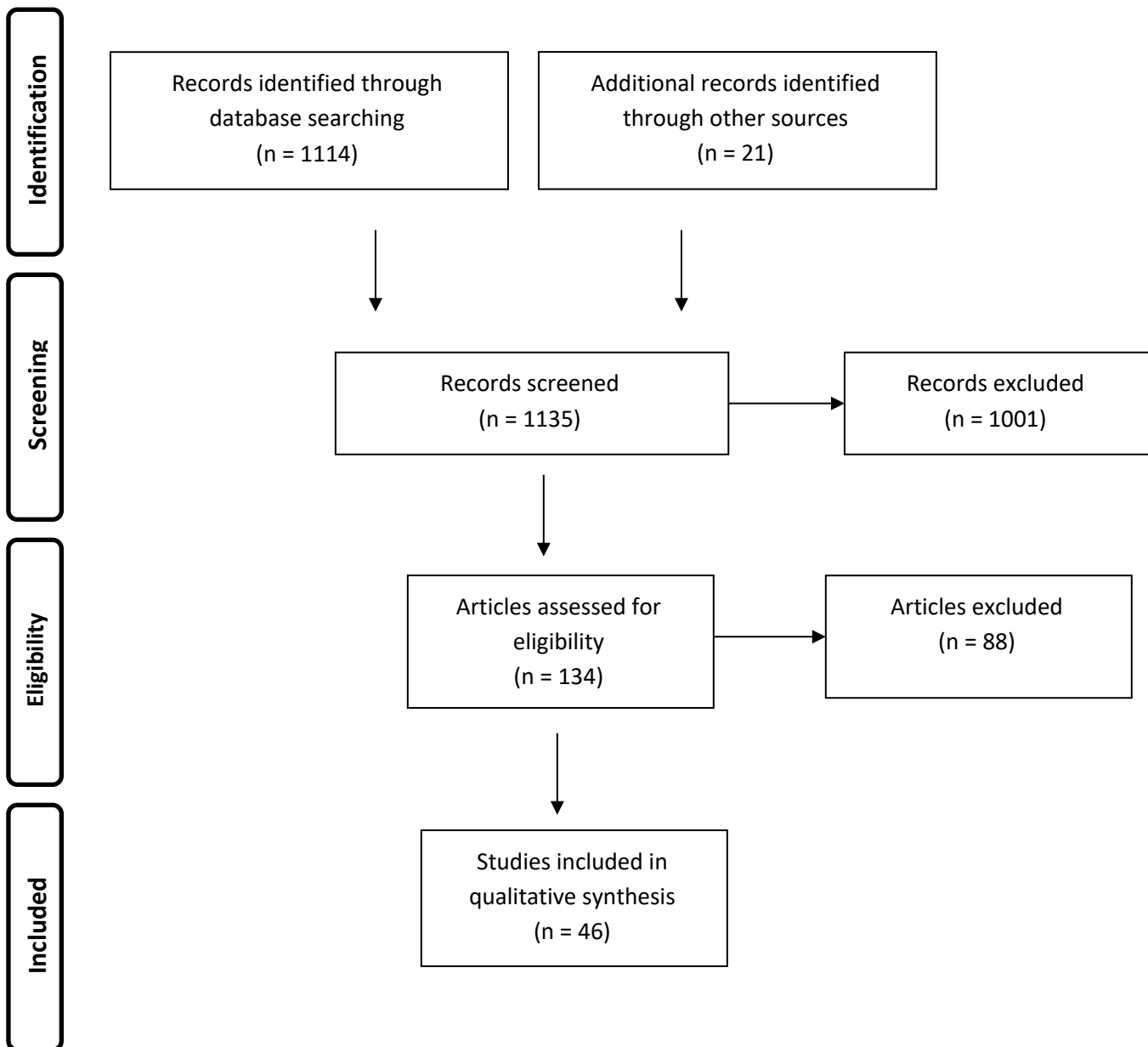


Figure 1. Selection flow diagram for the studies (adapted from the PRISMA selection flow diagram; Moher, Liberati, Tetzlaff, & Altman, 2009).

TABLE 1: Overview of EI intervention studies

The table is based on the PICOS framework, with reference to the sample (columns c, d, e), nature of the intervention (column g), comparison group (column h), outcomes (columns j, k, l, m, n, o), and study design (columns d, e, f). The significance level of the results is provided for the EI measure, with the *p* value just after the intervention (results of the difference between time 1 and time 2) in column “k”, and after follow-up, if there was one, in column “l”. The same indicator was used for the correlates of EI, i.e., the *p* value just after the intervention, column “n”, after follow-up, and column “o”.

<i>A</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>	<i>o</i>
	<i>Study</i>	<i>Sample</i>	<i>Active group</i> <i>n + mean age + % females</i>	<i>Control group</i> <i>n + mean age + % females</i>	<i>Rando mization</i>	<i>Format of the intervention</i>	<i>Format of control condition</i>	<i>Follow-up (if there was one)</i>	<i>EI measure</i>	<i>p. Time 1-time2</i>	<i>p after follow-up</i>	<i>Correlates</i>	<i>p Time 1-time2</i>	<i>p after follow-up</i>
1	<i>Abe & al., 2013</i>	Medical students	55 21.5 y 56% F	No	-	Half day (2h) workshop on mental health	No control group	1 year	TEIQue–SF	ns	.04	No	-	-
2	<i>Beigi & Shirmohammadi, 2010 & Beigi & Shirmohammadi, 2011</i>	Bank employees	68 35.1y 15% F	No	-	8x120 minutes EI course	No control group	No	ECI-2 ECI-2 360°	ns ²⁵	-	-Service quality ⁴	ns ⁴	-
3	<i>Boyatzis & Saatcioglu, 2008</i>	MBA executive students	45-65 years old	No	-	MBA Program	No control group	Over 2 years	LSP EAQ SAQ ECIU	-	From .10 to .001	No	-	-
4	<i>Chen, King, Cochran, & Argabright, 2014 (study 1)</i>	Attendees of the Leadership Institute	16 39y 56% F	No	-	2 full-day EI workshops, a 1-hour coaching and feedback session, and two 75-minute webinars	No control group	No	EQ-i	.05	-	No	-	-
	<i>Chen, King, Cochran, &</i>	Attendees of the Leadership Institute	14 45y 79% F	No	-	2 full-day EI workshops, a 1-hour coaching and	No control group	No	EQ-i	.05	-	No	-	-

	<i>Argabrigh t, 2014 (study 2)</i>					feedback session, and two 75-minute webinars								
5	<i>Cherniss, Grimm, & Liautaud, 2010</i>	Managers	81 30% F	89	Yes	One meeting a month (3hr) plus a two day two night retreat each year	Inactive control group ²⁹	No	ECI-2 ECI-2 360°	.001 .013	-	No	-	-
6	<i>Clark, Callister, & Wallace, 2003</i>	Business course students	121 46% F*	113	No	A semester management course	Inactive control group	No	EQ Map	.05	-	No	-	-
7	<i>Clarke, 2010a</i>	MBA students	80 30.4 y 31% F	22	No	1 day + 14 weeks of team-based learning	1 day individual learning	No	Mscsit <i>Dim 1</i> <i>Dim 2</i> <i>Dim 3</i> <i>Dim 4</i>	ns .001 Ns Ns	-	No	-	-
8	<i>Clarke, 2010b</i>	Project managers	53 40 y 60% F	No	-	2-day EI training	No control group	6 months	Mscsit <i>Dim 1</i> <i>Dim 2</i> <i>Dim 3</i>	ns ns ns	Ns Ns .01	-Empathy -Team work -Conflict management	ns ns ns	neg .05 .01
9	<i>Codier, Kamikawa , & Kooker, 2011</i>	Nurses managers	24 49.2 Y	No	-	Weekly peer sessions over a 6-month period	No control group	No	Mscsit	ng ⁸ .05	-	No	-	-
10	<i>Codier, Freitas, & Muneno, 2013</i>	Nurses	31	No	-	EI check-In rounds of 5- min duration over 10 months	No control group	No	Mscsit (no post test measures)	nr	-	No	-	-
11	<i>Crombie, Lombard, & Noakes, 2011</i>	Cricket players	24 21 y 100% M	24	Yes	10 three-hour EI sessions	Inactive control group	No	Mscsit	.001	-	No	-	-
12	<i>Dacre Pool & Qualter, 2012</i>	College students	66 24 y 53% F	68 22 y 57% F	No	11 weekly EI classes x2hr	Inactive control group	No	Mscsit Dim3 Dim4 ESES	.01 .05 .01	-	No	-	-

13	<i>Dugan, Weatherly, Girod, Barber & Tsue, 2014</i>	Physician residents	22 ¹⁶ 43 y 32% F	No	-	8-hour EI + continuous mentoring	No control group	Every year for 3 years ¹⁶	EQ-i	.001	-	-Patient satisfaction	nr ¹⁸	-
14	<i>Dulewicz & Higgs, 2004 (study 1)</i>	Retail managers	59 36.3 y 39% F	No	-	4 EI days over 4 weeks (1 month)	No control group	No (only one measure at 6 months)	EIQ	.01	-	No	-	-
15	<i>Fletcher, Leadbetter, Curran, & O'Sullivan, 2009</i>	Medical students	34 21.3 y 59 % F	36	No	One 4 h EI workshop and 7 sessions over 7 months	Inactive control group	No	EQ-i	.01	-	No	-	-
16	<i>Gignac, Harmer, Jennings, & Palmer, 2012</i>	Sales representatives	29 38.9 y 53% F*	21	No	11 EI hours over 3 months	Inactive control group	No	Genos EI Genos EI 360°	.009 ns	-	Increase of sales	0.05	-
17	<i>Gorgas, Greenberger & Way, 2013</i>	Emergency medicine residents	19 48% F	17		2-hour EI session + feedback	Waiting list	6 month	ESCI ¹³	.34	.05	No	-	-
18	<i>Grant, 2007</i>	Post-graduate students in the active group, sales managers in the control	23 50.9 y 70% F	20 45% F	No	13-week, spaced learning coaching training	2 days, block intensive coaching training	No	SEIS	.01	-	-Coaching skills	.05	-
19	<i>Groves, McEnrue, & Shen, 2008</i>	Business students	75 28.83 y 63% F*	60	No	11 week EI leadership program	Inactive control group	No	EISDI	.001	-	No	-	-
20	<i>Hen & Adi Sharabi, 2013</i>	Teachers	186 37.1 y 87% F	No	-	56-h (14-week EI training)	No control group	No	SSREIT	.001	-	Empathy (Iri): -Fantasy -Empathy -Perspective -Personal distress	ns ns ns .002 .015	-

21	<i>Hodzic, Ripoll, Lira, & Zenasni, 2015 and Hodzic, Ripoll & Bernall, 2015</i>	Unemploy ed adults	41 32.7 y 93% F	41 36.4 y 79% F	Yes	2.5-day EI training	Waiting list	6 months and 1 year (for unemploy ment)	TEIQue– SF	ns	ns	-Reemployment 1 year after Employability Self efficacy Coping Developing Hr	ns .05 .05 .05 .05	.01 .27 .08 .01 .05
22	<i>Jaeger, 2003</i>	Graduate students	31	119	No ²⁰	One semester course + EI	General manageme nt course	No	EQ-i	.026	-	-Academic performance	ns ²⁸	-
23	<i>Jahangard & al., 2012</i>	Borderline inpatients	15 24.4 y 53% F	15 24 y 53% F	Yes	Twelve 45 min EI sessions over 4 weeks	Treatment as usual	No	EQ-i	.01	-	-Depression	.001	-
24	<i>Karahan & Yalcin, 2009</i>	Type 2 diabetes mellitus patients	18 53 y 50% F	18 52 y 50% F	Yes	12 weekly EI classes x 1,5hr	Waiting-list	3 and 6 months ¹⁵	EQ-i	.001	.001	-Burnout -Anxiety -HbA1c	.001 .001 .001	.001 .001 .001
25	<i>Kirk, Schutte, & Hine, 2011</i>	Adult employees	46* 35,1 y* 71% F*	24	Yes	3 daily 20 minutes emotion writing	Neutral writing	No	AES ESE	.01 .05	-	-Positive affect -Workplace incivility	.01 .05	-
26	<i>Kotsou et al., 2011</i>	Working adults	72 38.24 y 68% F	60 38.85 y 67% F	No	2.5 day EI training with 1 month internet follow-up	Waiting list	1 year	TEIQue TEIQue 360°	.001 .001	.001 .001	- Perceived stress -Cortisol levels ⁶ -Somatic complaints - Life satisfaction - Quality of relationships -- Peer report quality of relationships	.001 .001 .001 .001 .001 .001 .03	.001 nr .001 .001 .001 .001 .03
27	<i>Kruml & Yockey, 2011</i>	MBA students	78 28.6 y 59% F	No	-	7-week vs 16- week leadership curricula	No control group	No	EQ-i	.001	-	No	-	-
28	<i>Latif, 2004</i>	Pharmacy students	Not reporte	No	-	A semester management	No control group	No	Ad hoc EI measure	.05	-	No	-	-

			d			course								
29	<i>Meyer, Fletcher, & Parker, 2004</i>	Dental practice employees	15 39.28 y 47% F	No	-	1 day experiential course	No control group	No	Mscsit	Ns	-	No	-	-
30	<i>Moriarty & Buckley, 2003</i>	Undergraduate business students	82 49% F	80	No	24 sessions in 12 weeks of team learning	Lectures on organizational behavior	No	WEIP-5	Ns ¹	-	No	-	-
31	<i>Muyia & Kacirek, 2009</i>	Executive education students	43 35% F	No		9 days over a 3-month period	No control group	No	EQ-i	.61	-	No	-	-
32	<i>Nelis et al., 2009</i>	College students	19 21 y 79% F	18 20.5 y 83% F	No	4 weekly classes x 2,5hr EI training	Inactive control group	6 months	TEIQue ERP-Q EMA TAS STEU DOE	- - - - - -	.08 ²⁶ .01 .05 .02 ns ns	No	-	-
33	<i>Nelis et al., 2011 (study 1)</i>	College students	29 20 y 72% F	29 20 y	No	Three 6-h sessions of EI training Or Six 3-h sessions	Inactive control group	6 month	TEIQue ERP-R STEU	- - -	.01 ²⁶ .01 .01	-Changes in personality : Extraversion Neuroticism Agreeableness Conscientiousness	ns ns ns ns	.01 .02 .01 ns
34	<i>Nelis et al., 2011 (study 2)</i>	College students	34 21 y 74% F	31 21 y 81% F and 27, 20 y 93% F	No	Three 6-h sessions of EI training Or Six 3-h sessions EI training	2 groups: Theater improvisation training and Inactive control group	No	TEIQue TEIQue 360° ERP-R	.02 ns .01	-	-Somatic complaints -Mental disorders -Happiness -Life satisfaction -Social functioning Employability	.01 .05 .05 ns .03 .04	-
35	<i>Nooryan, Gasparyan, Sharif, & Zoladl, 2011</i>	Physicians and nurses	53 33.19 y 31 % F	53 31.6 y 31 % F	No	10 sessions of 2 hours twice a week mental health training	Inactive control group	No	EQ-i	.001	-	-Trait anxiety -State anxiety	.001 .001	-
36	<i>Pérez-Escoda,</i>	Teachers	57 42 y*	35	No	30 hours of EI training in	Inactive control	No	CDE-A	.001	-	-Stress -Institutional	.001 .001	-

	<i>Filella, Alegre, & Bisquerra, 2012</i>		80% F*			sessions of 1 hour a week, for 30 weeks, over a period of 9 months	group					climate		
37	<i>Peter & Brinberg, 2012</i>	Overweight students	49 ? ¹⁰ 20.5 y 36% F	Not reported ¹⁰	-	A 75 minute EI session	Bogus effort group	No	MSCEIT -Dim 1 -Dim 2	.02 .05	-	-Calorie intake -Weight	ns ns	-
38	<i>Sharif & al., 2013</i>	Nurses	25 36.3 y 100% F	27 33 y 100% F	Clinical trial ²¹	2 day EI workshop	Inactive control group	1 month	EQ-i	.02	.01	-Mental health	.02	.03
39	<i>Slaski & Cartwright, 2003</i>	Middle managers	60 37 y 40% F	60 37 y 40% F	No	4 days of EI training over a month	Inactive control group	6 months (no measure immediately after the training)	EQ-I EIQ	- -	.001 .001	-Health -Morale -Distress -QOWL -Subjective stress -Performance	- - - - -	.001 .001 .001 .002 .001 ns
40	<i>Turner & Lloyd-Walker, 2008</i>	Project managers	24	Not reported	No	2 weeks EI training	Not stated	6 months ²⁷	ECI ECI 360°	-	.01 ns ³	-Job satisfaction -Job performance	-	.01 ns
41	<i>Vesely, Saklofske & Nordstokke, 2014</i>	Teacher candidate students	23 26.5 y* 89%F*	26	No	5 X 1.5 hours EI training over 5 weeks	Inactive control group	1 month	TEIQue-SF WLEIS	Ns .001		-Stress -Anxiety -Teacher efficacy -Satisfaction with life -Resiliency	ns ns ns ns ns	
42	<i>Wagstaff, Hanton, & Fletcher, 2013</i>	Sports organization participants	25	No	-	3 EI workshops (total 8 hr) over 18 weeks	No control group	3 months ¹²	MSCEIT	Ns		-Relationship quality	.001	
43	<i>Yalcin, Karahan, Ozelik, & Igde, 2008</i>	type 2 diabetes mellitus patients	18 54.33 y 50% F	18 51.17 y 50% F	Yes	12 weekly EI classes x1.30hr	Waiting list	3 and 6 months	EQ-i	.001		-Well-being - Quality of life -Health status	.001 .001 .001	
44	<i>Wing, Schutte, & Byrne, 2006</i>	Australian adults	175* 40.30 y* 64% F*	55 ¹¹	Yes	20 minutes of writing, 3 times on 3 consecutive days plus 1	Writing about positive experiences only and a	2 weeks	Assessing emotions scale	Ns ²²		- Satisfaction with life	ns	

						session 2 weeks later	writing only control condition							
45	<i>Zijlmans, Embregts, Gerits, Bosman, & Derksen, 2011</i>	Medical staff	34 36 y 79% F	26	No ²³	2 days of EI training + EI feedback sessions over 4 months	Not stated	No	EQ-i	.001	-	No	-	-
46	<i>Zijlmans, Embregts, Gerits, Bosman, & Derksen, 2015</i>	Medical staff	76 36.6 y* 36% F	138 (2 groups) 42% F	Yes	1.5 days EI training + 6 EI feedback sessions of 90 minutes	Not stated	4 months	EQ-i	.01	.01	-Task coping -- Emotion coping -Avoidance coping	.01 ²⁴ ns ns	.01 .01 .01

EISDI, Emotional intelligence self-description inventory; Teique, Trait Emotional Intelligence Questionnaire ; ERP-Q, Emotion Regulation Profile Questionnaire ; EMA, Emotional Management Abilities Test ; TAS20, Toronto Alexithymia Scale ; ER, Emotion regulation ; LSP, The Learning Skills Profile; EAQ, External Assessment Questionnaire; SAQ, Self-Assessment Questionnaire; ECIU, Emotional Competence Inventory (University Version); MSCEIT, Mayer-Salovey-Caruso Emotional Intelligence Test; ESE, Emotional Self-Efficacy Scale; EIQ is a tailored questionnaire ; EQ-I, BarOn Emotional Quotient Inventory; Genos, Genos Emotional Intelligence Inventory; SEIS, Schutte Emotional Intelligence Scale; WEIP, Workgroup emotional intelligence profile; AES, Assessing Emotions Scale; ESE, Emotional Self-Efficacy Scale ; STEU, Situational Test of Emotional Understanding ; DOE, Dimensions of Openness to Emotional experiences; SSREIT, The Schutte Self Report Emotional Intelligence Test; TEIQue-SF, Trait Emotional Intelligence Questionnaire - Short Form; WLEIS, Wong and Law Emotional Intelligence Questionnaire ; CDE-A, Emotional Development Inventory for Adults, ESCI, Emotional and social competency inventory; ECI, emotional competency inventory.

* Statistics for the total sample, training and control group

¹ The authors report a significant difference for one dimension out of ten, so, even if full statistics are not reported, it is highly improbable that a positive result could be found for the overall EI.

² The effect size is an approximation because the SD of the mean at time 2 was not reported.

³ There were some negative effects on the self-reported EI scale but the statistics are not reported.

⁴ Results of the condition x time interaction are not reported, but service quality improved numerically more in the control group.

⁵ Because the full dataset was not reported, we used the mean SD of the whole group to calculate the effect size

⁶ Cortisol levels were assessed only at 1 month, not at the immediate follow-up

⁷ Calculated with the means and standard deviations associated with the performance to budget (%) dependent variable increase from the first to fourth quarter. This represents an increase of 9% according to the paper.

⁸ Although the 15 remaining participants reported benefits for the intervention at time 2, the EI scores measured with the MSCEIT actually declined

⁹ Depressive symptoms decreased significantly over time in both groups, although the improvement was greater in the treatment than the control group (standard pharmacological treatment) group.

¹⁰ The study does not clearly report the sample

¹¹ Of the 175 participants returning questionnaires at pretest and immediate posttest, 58 were in the positive writing plus cued emotional regulation condition (group 1), 62 were in the positive writing only condition (group 2), and 55 were in the control condition (group 3).

¹² Only 3 participants were given this 3-month coaching follow-up

¹³ It was described as “Hay EI survey” in the paper.

¹⁴ Results are not clearly reported. Only one set of data is reported.

¹⁵ Results for the follow-up at 3 months, results maintained at 6 months

¹⁶ It is not clear which of the participants were assessed over the study: some joined after the first or the second wave of assessments.

¹⁷ Cohen’s d at one-year follow-up.

¹⁸ There was an increase in the department’s percentile ranking between the 3 years before EI training (89% in 2002, 90% in 2003, and 85% in 2004) and for 6 of the 7 years after EI training.

¹⁹ The experimental group took part in “some continuous improvement development exercises”

²⁰ The author reports that “In one of the five sections, the instructor introduced (..) emotional intelligence” but it is not a standard randomization process.

²¹ This study is supposed to be based on randomization, but the intervention group and the control group belong to two different hospitals: therefore, it is not possible that participants have been individually randomized

²² Participants in the emotion regulation condition at posttest scored significantly higher on emotional intelligence than those in the control group, but at follow-up, this difference was no longer significant. There was no difference at any time taking into account the interaction between the 3 groups.

²³ The authors report that the selection was “mostly random”.

²⁴ Results were significant only compared to the control group 2.

²⁵ Results were significant ($p < .01$) for the subdimension “Relationship management” related to self and others and the self-report dimension “Teamwork”

²⁶ These are the results for the Anova, Time X group including Time 1, 2 and 3

²⁷ The time 2 measure was at 6 month after the end of the intervention, there was no measure immediately after the intervention

²⁸ Author reports only correlations but they are significant in both groups

²⁹ An inactive control group is just a comparison group that does not undergo the intervention or another intervention and that is not listed in a waiting-list to undergo the intervention latter.