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Article:
Bedendo, Andre, Gaume, Jacques, Studer, Joseph et al. (2024) Mediational Analyses of the Effects of Social Behaviour and Network Therapy on Alcohol Use. European addiction research. 14–22. ISSN: 1022-6877

https://doi.org/10.1159/000535200

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Research Article

Eur Addict Res
DOI: 10.1159/000535200

Received: April 28, 2023
Accepted: September 3, 2023
Published online: December 4, 2023

Mediational Analyses of the Effects of Social Behaviour and Network Therapy on Alcohol Use

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Keywords
Alcohol · Mediation · Social behaviour and network therapy · Treatment active ingredients · Treatment evaluation

Abstract

Introduction: Social behaviour and network therapy involves an active participation of the practitioner in recruiting a supportive network to change the client's alcohol use. Despite achieving beneficial effects on alcohol consumption, its possible mechanisms of change are a relatively under-studied topic compared to those of other alcohol treatment interventions. This study aimed to explore therapist skills through which social behaviour and network therapy may achieve effects on alcohol consumption in comparison with motivational enhancement therapy. ***Methods:*** This study was secondary analysis of data from the UK Alcohol Treatment Trial, a multicentre, pragmatic, randomized controlled trial. The sample comprised 376 participants randomized to motivational enhancement therapy or social behaviour and network therapy. We used the UK Alcohol Treatment Trial Process Rating Scale to assess therapist skills. Outcomes drinks per drinking day and percentage of days abstinent were assessed 12 months after treatment initiation. Analyses were conducted in a simple mediation framework. ***Results:*** Therapist skills score (combining frequency and quality) for involving others in behaviour change mediated social behaviour and network therapy effects on percentage of days abstinent (b = 0.06, 95% CI: 0.02; 0.10, p = 0.01). The frequency with which therapists acted as an active agent for change also mediated the effects of social behaviour and network therapy on percentage of days abstinent (b = 0.03, 95% CI: 0.003; 0.05, p = 0.03). The frequency with which the therapist stressed social support as a key factor in achieving change unexpectedly mediated an increase in drinks per drinking day (b = 0.10, 95% CI: 0.01; 0.18, p = 0.02). The two latter mediation effects were not sustained when quality was considered. All other indirect effects tested were non-significant. ***Discussion/Conclusions:*** How social behaviour and network therapy exerts effects on alcohol outcomes is not yet well understood and in this study was not

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attributable to observed ratings of therapist treatment-specific skills. Therapist skill in planning the involvement of others during treatment, however, warrants further study. We suggest that the present findings should be regarded as hypothesis generating as it identifies specific targets for further investigation in alcohol treatment process studies.

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Introduction

Alcohol treatment trials are primarily designed to address whether the evaluated interventions work or not, and less attention is given to how they may work and under what circumstances [1]. The study of mediators and moderators has long been recognized as an important means of advancing understanding of how behaviour change works, and this can in turn assist in developing more effective interventions [2–4].

The United Kingdom Alcohol Treatment Trial (UKATT) study tested the null hypothesis that there were no differences in outcomes between a less intensive, motivationally based treatment (motivational enhancement therapy [MET]) and a more intensive socially based treatment (social behaviour and network therapy [SBNT]). The study was undertaken in a sample of 742 clients in treatment for alcohol problems [5, 6]. No group differences in alcohol outcomes were found between treatments after 3 and 12 months from study entry [6].

MET is a globally recognized treatment and has been broadly evaluated worldwide [7, 8]. MET uses a combination of motivational interviewing (MI) with personal feedback of assessment results [9]. Process studies have investigated mediators in MET and MI [10–17], making this a relatively well-understood treatment. SBNT's possible mediators have not been similarly studied.

SBNT is based on an integration of effective strategies found in other network and behavioural treatments. The essence of SBNT is the active involvement of the practitioner in recruiting a support network for change, focussed on reducing or stopping drinking and giving attention to life contexts and relationships, with the aim of replacing social support for drinking with social support for change [18]. Evidence shows that network support treatments can effectively change drinker's social network and improve long-term drinking outcomes [19, 20].

Our previous analyses of UKATT treatment processes found that the quality of MET skills significantly predicted 12-month alcohol outcomes across both MET and SBNT [10]. In addition, our recent study found that a change in social support for drinking by the end of the treatment did not operate as a mediator of SBNT skills on alcohol outcomes [21]. These findings underline the need for further study of how SBNT exerted its effects in UKATT.

A large literature attests to the importance of therapist skilfulness for positive treatment outcomes [22], including prior studies we have conducted on UKATT data (e.g., Gaume et al. [10]). Qualitative data from UKATT showed that three-quarters of the SBNT therapists and nearly half of the clients referred to the involvement of others, a specific therapist skill, as the most useful aspect of sessions [23]. This was also the factor to which clients most frequently attributed change in alcohol use [24]. Therefore, if not through altered social network, there is a need to understand how SBNT works as it secured treatment outcomes not inferior to MET in UKATT Research Team [6]. Therapist skill in delivering this treatment appears promising to investigate further.

Considering the main effects of the UKATT and that studies supporting the effects of treatment processes on 12-month alcohol outcomes, the aim of the present study was to examine whether SBNT effects on drinks per drinking day (DDD) and percentage of days abstinent (PDA) 12 months after treatment entry, in comparison with MET, were mediated by SBNT-specific therapist skills. Considering there are few studies on this specific topic and limitations of the available evidence on similar treatments, the present study examines the full range of quantity, quality, and combined quantity-quality measures in an exploratory fashion.

Materials and Methods

This study is a secondary analysis of data from UKATT, a multicentre, pragmatic, randomized controlled trial, and the largest trial of treatment for alcohol problems conducted in the UK. A detailed description of the original trial study is reported elsewhere [5, 6, 25].

Interventions

Participants in the UKATT study were randomized to MET or SBNT. SBNT is a social network-based treatment comprising multiple components drawn from well-established treatment principles. It employs a range of cognitive and behavioural strategies through a collaborative therapeutic relationship aimed to support clients to mobilize and develop positive social networks that are supportive of a change in drinking [5, 18]. In UKATT, SBNT was carried out in up to eight 50-min sessions over a maximum of 12 weeks [5]. In contrast to SBNT, MET is a shorter, less intensive, and less costly intervention, based on the principles of the MI [26] combined with feedback [9]. Clients randomized to

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MET received up to three sessions, the first two a week apart and the third approximately 6 weeks later, again within a maximum of 12 weeks [5].

Measures

UKATT primary outcomes were the number of DDD and PDA, both recorded at the final study outcome assessment 12 months after baseline [6]. Abstinent clients (i.e., having PDA = 100) were allocated a DDD of zero.

UKATT Process Rating Scale

Therapist skills were measured using the UKATT Process Rating Scale, a validated instrument specifically designed to monitor treatment fidelity and assess treatment processes in UKATT [27]. All UKATT therapy sessions were video recorded with the client's permission and one video per participant was randomly sampled, stratified by treatment condition, treatment centre, and session number (1–3 for MET; 1–8 to SBNT). The number of coded sessions by intervention group is presented as online supplementary Table 3 (for all online suppl. material, see https://doi.org/10.1159/000535200). Replacement of videos was used to maintain balance between the criteria above.

The Process Rating Scale measured both the frequency (to what extent the therapist carried out each specific item, rated from 0 = not at all to 4 = extensively) and quality (rating of the therapist's behaviour, ranging from 0 = not at all well to 4 = very well) of treatment-specific task completion. Quality items could not be assessed when the frequency measure was 0 (i.e., the specific item was not observed at all in the given session). Of 20 Process Rating Scale items, eleven were related to MET (not used in the present analysis) and nine were related to SBNT (homework, alternative activities to drinking, social support for change, involvement of others in behaviour change, identification of sources of support for change, therapist as task oriented, therapist as an active agent for change, collaboration, and interpersonal focus). A description of each SBNT process rating item is provided in online supplementary Table 1.

Videos were scored by two or three independent raters and the primary rater was blind to the therapy type. The rater was trained by the UKATT team and supervised using independently rated tapes to enhance rating manual adherence and score consistency over time. Inter-rater reliability was measured using intra-class correlations and overall agreement for individual items is considered high overall; additional details on the Process Rating Scale validity and reliability are available in Tober et al. [27].

Since quality items had large amounts of missing data (from 15% to 90%, particularly for MET sessions – see online suppl. Table 2), we created a new score combining frequency and quality. Quality scores were recoded to be negative for low quality (0 = −3, 1 = −2), neutral for medium quality (2 = 1), and positive for high quality (3 = 2, 4 = 3). These scores were then multiplied by the unchanged frequency score. The skills scores on this measure thus range from −12 (e.g., high frequency [4] of low quality skills [−3]) to +12 (e.g., high frequency [4] of high quality skills [3]). When the skill was not present (frequency = 0), a score of 0 was attributed. Online supplementary Table 2 presents the frequency, quality, and skills scores for each SBNT item by treatment groups.

Sample

The UKATT study sought to include clients who would normally receive an offer of treatment for alcohol problems from British treatment facilities. The sample was recruited from seven treatment sites and included clients aged 16 and over [6]. Of the 742 participants in the UKATT, 290 had no video available for Process Rating Scale coding or were unrateable. Among the 452 participants with available videos, we only considered data from participants with 12-month follow-up assessment, resulting in a sample of 376 (N = 159 for SBNT and N = 217 for MET).

Analyses

Simple Mediation

We used a simple mediation approach to identify potential mediators of SBNT effects on DDD and PDA compared to MET. Mediation models provide information on direct, indirect, and total effects. The direct effect (known as the *c*' path) refers to the effect of X on Y independently of all mediators (i.e., controlling for all mediators) [28]. The indirect effect represents how Y is influenced by X through a causal dependence where X influences the mediator M (known as the a path) and M influences Y (known as the *b path*) [28]. Said another way, the indirect effect represents the influence of X on Y passing through M. The total effect is the combined effect of the direct and indirect effects and corresponds to the main effect of X on Y (i.e., without controlling for M).

First, we modelled Process Rating Scale frequency items as simple mediators. Second, we repeated these models using our new skills scores (combined frequency and quality). We used separate models for each outcome (PDA and DDD). All mediation models considered the randomization group (0 = MET; 1 = SBNT) as the X variable and all models were controlled for age, sex, the baseline measure of the outcome, and the number of days between baseline and the coded session (to control for time in treatment). We used the robust ML estimator and confidence intervals were calculated using bootstrap sampling with 5,000 draws. Analyses were performed using R v4.1.1 [29] and RStudio [30] via package *lavaan* [31] and with the minimum significance level of 5%.

Sensitivity Analysis

We used a Bayesian approach estimator for sensitivity analysis, which combines prior distributions to form posterior distributions for the parameter estimates [32]. This estimator uses Markov chain Monte Carlo algorithms to create approximations to the posterior distributions and accounts for the skewness of the outcomes. Analyses used non-informative priors and 95% credible interval, which is the default option in Mplus [32]. Model fit considered the posterior predictive p value [33], and values close to 0.5 suggest that the model is true or close to true [34]. We set the number of iterations to 30,000 and model convergence was checked using the potential scale reduction values after increasing the number of fixed iterations to 60,000. Sensitivity analyses were performed using Mplus v7 [35] with 5% significance level.

Results

Table 1 presents sample characteristics and outcome data used in the present analyses. There were no significant differences between treatment groups on sample

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Table 1. Sample characteristics and outcome data by treatment group

	MET (*N* = 217)	SBNT (*N* = 159)	Total (*N* = 376)	*p* value*
Sex, *n* (%)				0.534
Male	159 (73.3)	121 (76.1)	280 (74.5)	
Female	58 (26.7)	38 (23.9)	96 (25.5)	
N	217	159	376	
Age, years, mean (SD)	42.5 (10.2)	42.5 (9.6)	42.5 (9.9)	0.954
Drinks per drinking day, mean (SD)				
Baseline	23.0 (12.5)	25.0 (15.6)	23.8 (13.9)	0.166
12-Month follow-up	14.6 (13.1)	15.6 (15.4)	15.0 (14.1)	0.475
Percentage of days abstinent, mean (SD)				
Baseline	29.9 (26.8)	25.1 (24.9)	27.9 (26.1)	0.076
12-Month follow-up	51.5 (38.2)	51.0 (36.1)	51.2 (37.3)	0.900

χ^2 tests used for categorical variables and ANOVA for continuous. MET, motivational enhancement therapy; SBNT, social behaviour and network therapy.

characteristics and outcomes. Descriptive data for each mediator by intervention group is presented in online supplementary Table 2. SBNT group had significantly higher scores for all frequency items, and for all combined skills scores, except for collaboration which showed a non-significantly different combined skills score across groups ($p = 0.096$).

Mediation Models

The mediation models using Process Rating Scale frequency items are shown in Table 2. The SBNT group showed significantly higher frequency of all mediators compared to MET (*a paths*), providing further evidence of the distinct nature of the delivery of the treatments. Only two mediators, however, were significantly related to the outcome (*b paths*). First, therapist as active agent was associated with higher PDA. Second, social support for change was unexpectedly associated with higher and not lower DDD at 12 months.

Consistently, examination of indirect effects showed that the frequency of *therapist as active agent* mediated the effects of SBNT by increasing PDA after 12 months (indirect effect = 0.03, 95% CI: 0.003; 0.05, $p = 0.03$). Similarly, but in the opposite direction, the frequency of therapist advocacy of *social support for change* mediated the effects of SBNT by increasing DDD after 12 months (indirect effect = 0.10, 95% CI: 0.01; 0.18, $p = 0.02$). The findings were confirmed in the sensitivity analysis (online suppl. Table 4).

The models using the combined skills scores (combining frequency and quality of SBNT items) as mediators are presented in Table 3. Compared to MET, the SBNT group showed significantly higher scores on all tested mediators (*a* paths), except for *therapist as active agent* and *collaboration*, which were non-significant. Higher skills scores on *involvement of others in behaviour change* and *therapist as active agent* were related to increased PDA at 12 months (*b paths*). Consistently, there was only one significant indirect effect for *involving others in behaviour change*, which mediated SBNT effects on PDA (indirect effect = 0.06, 95% CI: 0.02; 0.10, $p = 0.009$). The findings were confirmed in the sensitivity analysis (see online suppl. Table 5).

Discussion

The main findings of this study are that as follows: (1) Compared to MET, SBNT effects on alcohol outcomes were not mediated by treatment-specific therapist skills as measured by the Process Rating Scale; (2) therapists acting more frequently as an active agent supporting behaviour change and showing higher skills scores (combined frequency and quality) in planning the involvement of others in working towards behaviour change mediated SBNT effects on increasing percentage of days abstinent; and (3) in contrast, the frequency with which therapists stressed the importance of social support in achieving change unexpectedly mediated effects of SBNT in increasing drinking (i.e., increased DDD).

This study is the first investigation dedicated to understanding the role of treatment-specific therapist skills in how SBNT works. The results are derived from a large sample in a pragmatic trial, which enhances data generalizability to populations that typically receive treatment for alcohol problems [5, 6]. The sensitivity analysis

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Table 2. Simple mediation models for SBNT frequency items

	Outcome: DDD			Outcome: PDA		
	B*	95% CI	*p* value	B*	95% CI	*p* value
Homework						
Treatment group -> mediator (a)	**0.43**	**0.36; 0.50**	**<0.001**	**0.43**	**0.36; 0.50**	**<0.001**
Mediator -> outcome (b)	0.06	−0.04; 0.15	0.276	0.00	−0.10; 0.11	0.940
Direct effect (c′)	−0.01	−0.11; 0.09	0.797	0.01	−0.09; 0.12	0.778
Indirect effect	0.02	−0.02; 0.07	0.276	0.00	−0.04; 0.05	0.940
Total effect (c)	0.01	−0.08; 0.10	0.817	0.02	−0.08; 0.11	0.731
Alternative activities to drinking						
Treatment group -> mediator (a)	**0.23**	**0.14; 0.32**	**<0.001**	**0.22**	**0.13; 0.32**	**<0.001**
Mediator -> outcome (b)	−0.04	−0.13; 0.05	0.372	−0.01	−0.11; 0.09	0.846
Direct effect (c′)	0.02	−0.07; 0.11	0.678	0.02	−0.08; 0.12	0.711
Indirect effect	−0.01	−0.03; 0.01	0.379	0.00	−0.03; 0.02	0.846
Total effect (c)	0.01	−0.08; 0.10	0.819	0.02	−0.08; 0.11	0.731
Social support for change						
Treatment group -> mediator (a)	**0.64**	**0.59; 0.70**	**<0.001**	**0.64**	**0.59; 0.70**	**<0.001**
Mediator -> outcome (b)	**0.15**	**0.02; 0.28**	**0.023**	−0.05	−0.16; 0.07	0.419
Direct effect (c′)	−0.09	−0.21; 0.04	0.170	0.05	−0.07; 0.17	0.442
Indirect effect	**0.10**	**0.01; 0.18**	**0.023**	−0.03	−0.10; 0.04	0.419
Total effect (c)	0.01	−0.08; 0.10	0.815	0.02	−0.08; 0.11	0.731
Involve others in behaviour change						
Treatment group -> mediator (a)	**0.70**	**0.65; 0.76**	**<0.001**	**0.71**	**0.65; 0.76**	**<0.001**
Mediator -> outcome (b)	0.00	−0.13; 0.13	0.990	0.11	−0.03; 0.25	0.131
Direct effect (c′)	0.01	−0.11; 0.13	0.871	−0.06	−0.20; 0.08	0.403
Indirect effect	0.00	−0.09; 0.09	0.990	0.08	−0.02; 0.18	0.130
Total effect (c)	0.01	−0.08; 0.10	0.813	0.02	−0.08; 0.11	0.731
Identify sources of support for change						
Treatment group -> mediator (a)	**0.43**	**0.36; 0.50**	**<0.001**	**0.43**	**0.36; 0.50**	**<0.001**
Mediator -> outcome (b)	−0.03	−0.15; 0.09	0.626	−0.05	−0.15; 0.06	0.373
Direct effect (c′)	0.02	−0.07; 0.12	0.631	0.04	−0.07; 0.14	0.487
Indirect effect	−0.01	−0.06; 0.04	0.626	−0.02	−0.07; 0.03	0.377
Total effect (c)	0.01	−0.08; 0.10	0.813	0.02	−0.08; 0.11	0.731
Therapist as task oriented						
Treatment group -> mediator (a)	**0.55**	**0.47; 0.62**	**<0.001**	**0.54**	**0.47; 0.62**	**<0.001**
Mediator -> outcome (b)	−0.07	−0.17; 0.04	0.203	0.04	−0.08; 0.16	0.507
Direct effect (c′)	0.05	−0.06; 0.16	0.404	−0.01	−0.13; 0.11	0.922
Indirect effect	−0.04	−0.09; 0.02	0.207	0.02	−0.04; 0.09	0.507
Total effect (c)	0.01	−0.08; 0.10	0.811	0.02	−0.08; 0.11	0.731
Therapist as active agent						
Treatment group -> mediator (a)	**0.22**	**0.14; 0.30**	**<0.001**	**0.22**	**0.14; 0.30**	**<0.001**
Mediator -> outcome (b)	−0.08	−0.20; 0.04	0.167	**0.13**	**0.03; 0.22**	**0.009**
Direct effect (c′)	0.03	−0.06; 0.12	0.529	−0.01	−0.11; 0.09	0.825
Indirect effect	−0.02	−0.05; 0.01	0.190	**0.03**	**0.00; 0.05**	**0.026**
Total effect (c)	0.01	−0.08; 0.10	0.810	0.02	−0.08; 0.11	0.731
Collaboration						
Treatment group -> mediator (a)	**0.41**	**0.32; 0.51**	**<0.001**	**0.41**	**0.31; 0.50**	**<0.001**
Mediator -> outcome (b)	−0.02	−0.12; 0.07	0.659	−0.05	−0.14; 0.05	0.321
Direct effect (c′)	0.02	−0.08; 0.11	0.691	0.04	−0.06; 0.14	0.476
Indirect effect	−0.01	−0.05; 0.03	0.661	−0.02	−0.06; 0.02	0.318
Total effect (c)	0.01	−0.08; 0.10	0.814	0.02	−0.08; 0.11	0.731
Interpersonal focus						
Treatment group -> mediator (a)	**0.40**	**0.31; 0.49**	**<0.001**	**0.40**	**0.31; 0.50**	**<0.001**
Mediator -> outcome (b)	0.01	−0.09; 0.11	0.899	0.04	−0.06; 0.14	0.432
Direct effect (c′)	0.01	−0.09; 0.11	0.870	0.00	−0.10; 0.10	0.999
Indirect effect	0.00	−0.04; 0.04	0.899	0.02	−0.03; 0.06	0.436
Total effect (c)	0.01	−0.08; 0.10	0.813	0.02	−0.08; 0.11	0.731

Models were controlled for sex, age, days from baseline, and outcome at baseline. Treatment group was coded as 0 = MET and 1 = SBNT. Effects in bold were significant on a level of $p < 0.05$. DDD, drinks per drinking day; PDA, percentage days abstinent; MET, motivational enhancement therapy; SBNT, social behaviour and network therapy. *All coefficients are standardized.

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using a Bayesian approach helps to attenuate type 1 error as it does not rely on large sample theory and data normality [32]. Results should however be interpreted in the light of study limitations. We tested only those SBNT-specific therapist skills that were expected to be not or minimally present in MET sessions in line with the UKATT design. Process Rating Scale measures were rated within only one treatment session over the 8 possible sessions in SBNT and 3 in MET and thus capture only a portion of the full treatment. Treatments were delivered over multiple sessions and we were not able to capture possible effects of treatment attrition, and relatedly, we may have missed therapeutic processes that further developed towards the end of the full treatment. It is important to note, however, that despite being a longer intervention, SBNT did not differ in effectiveness from MET, with both therapy groups showing reductions in drinking over 12 months [6]. Despite the longitudinal design supporting the temporality of the process measures, the results presented cannot be assumed as causal when one bears in mind these caveats.

The present study identified three therapist SBNT skills that significantly mediated the effect of SBNT on alcohol outcome, as compared to MET. When using skills scores combining frequency and quality, therapists' skills in planning the involvement of others in behaviour change showed a significant indirect effect on percentage of days abstinent. Developing and consolidating a social network for change by involving the client's social network is a basic principle of SBNT [18], and our findings support this basic concept and other evidence underscoring the importance of client's network in achieving beneficial outcomes [36–38]. A previous qualitative study in UKATT showed that the involvement of others was considered the most useful aspect of sessions for the majority of SBNT therapists and nearly half of the clients; clients also frequently attributed to this factor their change in alcohol use [23, 24]. There is clearly a need to develop a clearer understanding of how, and how well, the involvement of others is accomplished by the therapist within the treatment process.

When examining the findings on the frequency items, a clear picture emerges of a rather complex set of phenomena. The extent to which therapists actually carried out tasks on behalf of the client (*therapist as active agent*, e.g., telephoning or writing to the friends or family of the client about their drinking and treatment, with the consent of the client) showed a significant indirect effect on percentage of days abstinent. It should be noted in passing that the skills score combining frequency and quality for this item was related to increased percentage of days abstinent (*b* path), but treatment did not predict the mediator (*a* path, $p = 0.06$). *Therapist as active agent* for change is the Process Rating Scale item with lowest inter-rater reliability, low frequency ratings, and low loadings [27]. Many of the tasks related to this skill largely occur, by definition, between sessions (e.g., telephoning, visiting, or writing to network members) and the quality of performance, beyond the fact that they have been undertaken, may not be evident during the recorded session. For these reasons, this skill was only coded as being present in approximately 10% of the sessions.

That is only part of the picture, however, as the frequency with which therapists stressed the importance of social support in achieving change showed a significant indirect effect, yielding unwanted treatment outcomes. This adverse effect disappeared, however, in the analysis of the skill score, indicating that if this core treatment task is performed well, then there is no adverse effect. This finding, therefore, shows that there are sessions in which frequent emphasis on the importance of social support is not performed well, and this can detract from positive treatment outcomes. Other evidence suggests that social network intervention effects are mediated by changes in the proportion of non-drinkers in a client's network, rather than how supportive of drinking is the network [20].

This particular finding should also be interpreted in the context of the other mediational findings. Taken together, therapists concentrating more on being active agents of change, by doing things that help clients with their consent, rather than being mere advocates for social support of change, leads to better treatment outcomes. These findings are also congruent with the other demonstrated mediator incorporating skill in involving others in change, suggesting that how well the closely related tasks are accomplished has important implications for treatment outcome. This is also in line with our previous study finding in which quality, but not frequency, of MET skills is on the causal pathway to observed outcomes, including for SBNT [10].

It is well established that social networks play an integral role in treating drinking problems and that influences may be positive, negative, or mixed [39]. The level of emotional support provided by network members and the quality of their support are related to abstinence and relapse rates [40]. Therefore, it has been suggested that if the client has little investment in his or her social network or the network has a strongly negative influence the therapist should attend less to involving social network members [39]. Thus, it could also be the case that the unexpected negative result may have occurred due to

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Table 3. Simple mediation models for SBNT skills scores (combined frequency and quality)

	Outcome: DDD			Outcome: PDA		
	B*	95% CI	*p* value	B*	95% CI	*p* value
Homework						
Treatment group -> mediator (a)	**0.33**	**0.25; 0.40**	**<0.001**	**0.33**	**0.25; 0.40**	**<0.001**
Mediator -> outcome (b)	0.03	−0.06; 0.12	0.561	−0.06	−0.15; 0.03	0.169
Direct effect (c′)	0.00	−0.09; 0.10	0.968	0.04	−0.06; 0.14	0.476
Indirect effect	0.01	−0.02; 0.04	0.561	−0.02	−0.05; 0.01	0.171
Total effect (c)	0.01	−0.08; 0.10	0.814	0.02	−0.08; 0.11	0.731
Alternative activities to drinking						
Treatment group -> mediator (a)	**0.15**	**0.06; 0.25**	**0.002**	**0.16**	**0.06; 0.26**	**0.001**
Mediator -> outcome (b)	0.01	−0.07; 0.10	0.718	0.01	−0.08; 0.10	0.835
Direct effect (c′)	0.01	−0.08; 0.10	0.853	0.02	−0.08; 0.11	0.760
Indirect effect	0.00	−0.01; 0.02	0.720	0.00	−0.01; 0.02	0.835
Total effect (c)	0.01	−0.08; 0.10	0.812	0.02	−0.08; 0.11	0.731
Social support for change – general						
Treatment group -> mediator (a)	**0.27**	**0.19; 0.35**	**<0.001**	**0.27**	**0.18; 0.35**	**<0.001**
Mediator -> outcome (b)	0.06	−0.07; 0.18	0.371	0.00	−0.10; 0.10	0.963
Direct effect (c′)	0.00	−0.1; 0.09	0.931	0.02	−0.08; 0.12	0.752
Indirect Effect	0.01	−0.02; 0.05	0.388	0.00	−0.03; 0.03	0.963
Total effect (c)	0.01	−0.08; 0.10	0.813	0.02	−0.08; 0.11	0.731
Involve others in behaviour change						
Treatment group -> mediator (a)	**0.41**	**0.32; 0.5**	**<0.001**	**0.42**	**0.32; 0.51**	**<0.001**
Mediator -> outcome (b)	−0.05	−0.14; 0.04	0.274	**0.14**	**0.04; 0.24**	**0.007**
Direct effect (c′)	0.03	−0.07; 0.13	0.526	−0.04	−0.14; 0.06	0.424
Indirect effect	−0.02	−0.06; 0.02	0.281	**0.06**	**0.02; 0.10**	**0.009**
Total effect (c)	0.01	−0.08; 0.10	0.806	0.02	−0.08; 0.11	0.731
Identify sources of support for change						
Treatment group -> mediator (a)	**0.36**	**0.29; 0.43**	**<0.001**	**0.37**	**0.30; 0.43**	**<0.001**
Mediator -> outcome (b)	0.02	−0.09; 0.13	0.725	−0.07	−0.17; 0.02	0.129
Direct effect (c′)	0.00	−0.09; 0.10	0.944	0.04	−0.06; 0.15	0.395
Indirect effect	0.01	−0.03; 0.05	0.725	−0.03	−0.06; 0.01	0.141
Total effect (c)	0.01	−0.08; 0.10	0.814	0.02	−0.08; 0.11	0.731
Therapist as task oriented						
Treatment group -> mediator (a)	**0.38**	**0.29; 0.48**	**<0.001**	**0.38**	**0.29; 0.48**	**<0.001**
Mediator -> outcome (b)	−0.02	−0.11; 0.07	0.623	0.10	−0.01; 0.21	0.079
Direct effect (c′)	0.02	−0.08; 0.12	0.705	−0.02	−0.13; 0.09	0.690
Indirect effect	−0.01	−0.04; 0.03	0.629	0.04	−0.01; 0.08	0.087
Total effect (c)	0.01	−0.08; 0.10	0.812	0.02	−0.08; 0.11	0.731
Therapist as active agent						
Treatment group -> mediator (a)	0.09	0.00; 0.18	0.062	**0.09**	**0.00; 0.18**	**0.060**
Mediator -> outcome (b)	−0.09	−0.20; 0.02	0.124	**0.15**	**0.07; 0.23**	**<0.001**
Direct effect (c′)	0.02	−0.07; 0.11	0.684	0.00	−0.09; 0.10	0.945
Indirect effect	−0.01	−0.02; 0.01	0.268	0.01	0.00; 0.03	0.140
Total effect (c)	0.01	−0.08; 0.10	0.811	0.02	−0.08; 0.11	0.731
Collaboration						
Treatment group -> mediator (a)	0.09	−0.03; 0.21	0.140	0.09	−0.03; 0.21	0.144
Mediator -> outcome (b)	−0.05	−0.16; 0.06	0.371	0.02	−0.07; 0.11	0.682
Direct effect (c′)	0.02	−0.08; 0.11	0.740	0.01	−0.08; 0.11	0.758
Indirect effect	0.00	−0.02; 0.01	0.442	0.00	−0.01; 0.01	0.701
Total effect (c)	0.01	−0.08; 0.10	0.806	0.02	−0.08; 0.11	0.731
Interpersonal focus						
Treatment group -> mediator (a)	**0.41**	**0.32; 0.50**	**<0.001**	**0.41**	**0.33; 0.50**	**<0.001**
Mediator -> outcome (b)	0.00	−0.12; 0.12	0.991	0.05	−0.05; 0.15	0.316
Direct effect (c′)	0.01	−0.10; 0.12	0.847	−0.01	−0.11; 0.10	0.925
Indirect effect	0.00	−0.05; 0.05	0.991	0.02	−0.02; 0.06	0.314
Total effect (c)	0.01	−0.08; 0.10	0.813	0.02	−0.08; 0.11	0.731

Models were controlled for sex, age, days from baseline, and outcome at baseline. Treatment group was coded as 0 = MET and 1 = SBNT. Effects in bold were significant on a level of $p < 0.05$. DDD, drinks per drinking day; PDA, percentage days abstinent; MET, motivational enhancement therapy; SBNT, social behaviour and network therapy. *All coefficients are standardized.

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therapists stressing the importance of social support among clients without a clearly supportive network (i.e., in the absence of change in network composition). Although therapists can provide interventions that initiate behavioural changes, the client's social network, if not reconfigured by them, could prevail over the longer term [41]. Therefore, future studies should explore whether the supported mediators are related to changes in social network configuration.

Overall, the results of this study should be interpreted in light of all other non-significant indirect effects, indicating that most hypothesized SBNT therapist skills did not mediate SBNT effects on alcohol outcomes. The frequency of all items and most skills scores (combining frequency and quality) of items theorized as SBNT skills were actually higher in SBNT (i.e., significant *a* paths). This suggests that even though they are not found only in SBNT, they occurred, as expected, with higher frequency and more skilfully within its sessions. The effects on alcohol outcomes after 12 months were, however, largely not related to these processes (i.e., non-significant *b* paths). Together with our recent study showing that changes in a client's social support for drinking after treatment did not mediate the effects of SBNT skills on alcohol outcomes [21], the present findings should emphasize that processes of change relating to SBNT remain largely unknown.

Study findings are, nonetheless, interesting in various ways. They are treatment specific, belonging to the distinctive SBNT content, and at the same time likely to be one component of a repertoire of advanced skills possessed by well-trained therapists. Teasing apart the common factors at play and their interplay with treatment-specific elements is one of the major challenges that has faced the alcohol treatment field for some time, and this remains an ongoing challenge [42]. Therefore, as the analyses were exploratory in nature, we suggest that the present findings should be regarded as hypothesis generating and due for further confirmation in studies of the active ingredients in alcohol treatment.

Conclusions

In conclusion, in UKATT we found little support for the hypothesis that SBNT exerted effects on alcohol outcomes in ways that were clearly distinct from MET, despite the contrasting nature of the two treatments as they were delivered. Better outcomes were obtained through the application of more advanced therapist skills in planning the involvement of others in behaviour change and through more frequent activity on the part of the therapist on behalf of the client, including actions outside treatment sessions. Unexpected findings suggest stressing the importance of social support needs to be handled carefully. The main contribution of the present study is to identify specific targets for further investigation in alcohol treatment process studies.

Statement of Ethics

Ethical approval was obtained through the local NHS Ethics Committee for each of the seven treatment centres and in accordance with national guidelines. Written informed consent was obtained from each participant prior to participation, and the authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

A.B. received grants from São Paulo Research Foundation (FAPESP): grants #: 2017/13831-9, 2018/12729-9 and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq): grant # 427671/2018-3. M.L.O.S.F. received grant from CNPq: #315769/2018-1, Associação Fundo de Incentivo à Pesquisa (AFIP), and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES Print). UKATT (the United Kingdom Alcohol Treatment Trial) funding was funded by the Medical Research Council (Project Grant G9700729). The funding agencies did not play any role in study design, collection, analysis, and interpretation of data.

Author Contributions

A.B., J.G., and J.M. outlined the present study. N.H., G.T., and D.R. were part of the research team who designed, got funding, and conducted the parent trial (UKATT Research Team). A.B. performed the analyses and wrote the first draft of the manuscript. J.M., J.G. and J.S. reviewed the analyses. M.L.O.S.F. contributed to data interpretation. All authors contributed to manuscript writing, editing, or data interpretation. All authors revised and approved the final manuscript.

Data Availability Statement

Research data are not publicly available on legal or ethical grounds. Further enquiries can be directed to the corresponding author.

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