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How is motivational interviewing (un)related to self-determination theory: An empirical study from different healthcare settings

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To explore how quality aspects and clients' verbal behaviors in Motivational Interviewing sessions correspond with counsellors' support of basic psychological needs described in Self-determination Theory, we conducted a mixed method study with quantitative analyses of transformed qualitative data from counselling sessions. Coding manuals identified if the counselling was consistent with Motivational Interviewing and the support of basic psychological needs. The study supported a conceptual relationship between motivational interviewing (MI) and self-determination theory (SDT), except for autonomy support which was conceptualized differently in the two approaches. Relational support in SDT and MI were closely linked to each other and were also strongly related to other MI-congruent and promotive counselors' verbal behavior. Client amotivation in SDT and change talk in MI were negatively correlated, and clients' autonomous motivation in SDT was related to change talk in MI. Counselors emphasized relational support, using decisional balance comprehensively, but offered competence support less often. The counseling was, however, sensitive to the clients' motivational regulation of behavior change.

Key words: Motivational interviewing, self-determination theory, directive counseling, quality assessment.

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INTRODUCTION

In order to target health behavior change of persons at risk of non-communicable diseases, effective and easily available methods are mandatory. The effectiveness of behavior change interventions depends on factors concerning both the client and the counselor, as well as the context. The guidelines from the national institute for health and care excellence (NICE) on individual approaches to behavior change recommends interventions that motivate and support people, and to recognize how the social contexts and relationships may affect behavior (NICE, 2014). The interventions should use effective behavior change techniques and identify and plan for situations that might undermine the changes they are trying to make. Access to education and training, enabling practitioners to develop skills and competencies is warranted. Standard models of person-centered care and shared decision making rely on unrealistic assumptions of patient capacities. In many applications, such approach might have detrimental effects. Instead, the NICE guideline suggests an approach that ensure that patients are able to execute rational decisions, taken jointly with care professionals when performing self-care (Herlitz, Munthe, Törner & Forsander, 2016).

Motivational interviewing (MI) is described as a person-centered counseling style for addressing the common problem of ambivalence about change (Miller & Rollnick, 2013). Technically MI is goal-directed communication with particular attention to the language of change, designed to strengthen motivation and commitment to a specific goal by eliciting and exploring the person's own reasons for change within an atmosphere of acceptance and compassion (Miller & Rollnick, 2013). In MI consultations evoking the client's own reasons for behavior change and preventing resistance has replaced persuasion and confrontation. MI was developed as a clinical tool in counseling concerning risky use of alcohol, originally designed for working with people who are less ready to change but is now in widespread use in healthcare and social work (Miller, 1983). A systematic review of randomized clinical trials, that compared MI to counseling not applying MI in a somatic medical setting, found that MI showed promising effects in HIV viral load, dental outcomes, death rate, body weight, alcohol and tobacco use, sedentary behavior, self-monitoring, confidence in change, and approach to treatment (Lundahl, Moleni, Burke *et al*., 2013).

The development of MI started out as an inductive empirical approach, developing and testing hypotheses about what actually promotes change based on observations in clinical practice. MI is grounded on a person-centered approach, and MI research intends to bridge the divide between evidence-based practice and the importance of the therapeutic relationship (Miller & Moyers, 2017). MI was developed "bottom-up," based on clinical experience and without a specific theoretical framework. To study how and why an empirically founded counseling method works, theory is relevant.

Foote, DeLuca, Magura *et al*. (1999) and Ginsberg, Mann, Rotgers & Weekes (2002) proposed Self-determination Theory (SDT) as a theoretical framework to explain how and why MI works (Foote *et al*., 1999; Ginsberg *et al*., 2002). SDT was developed as an empirically based theory, suggesting that

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counselors may enhance behavior change and maintenance of new habits by positively influencing the quality of clients' motivation. This is done by supporting three basic psychological needs; the need for autonomy, competence and relatedness (Ryan, Patrick, Deci & Williams, 2008). In SDT, qualitative aspects of motivation are important. Personal endorsement and volition towards behavior change represents autonomous regulation and high quality of motivation. To comply with feelings of pressure and tension represents controlled regulation, while disengagement and lack of interest in behavior change represents amotivation (Ryan *et al*., 2008).

Markland, Ryan, Tobin & Rollnick (2005) have suggested that SDT can contribute to explain the efficacy of MI, and that MI should be understood as a method of promoting autonomous motivation, rather than intrinsic motivation (Markland *et al*., 2005). Referring to the classical work of Lewin (1952), Vansteenkiste and Sheldon (2006) argued that SDT could supply MI with a more articulated language to describe the type of motivation promoted by MI and a process account of "how MI works" (Lewin, 1952; Vansteenkiste & Sheldon, 2006). Patrick and Williams (2012) also recognized a conceptual overlap and complementarity of MI and SDT, and suggested that MI may offer SDT some specific directions with respect to the clinical utility of the theory (Patrick & Williams, 2012).

In SDT-based interventions, practitioners often use MI techniques to facilitate change talk in an autonomy supportive way. However according to SDT, change talk is an element of effective change only to the degree that it is autonomously enacted (Deci & Ryan, 2012). The goal according to SDT is self-determination and endorsement also when the client volitionally resists changing behavior. In MI counseling the goal is always behavior change, but with the assumption and honoring of personal autonomy (Miller & Rollnick, 2009).

The effect of a specific counseling technique depends not only on the technique applied ("what"), but also on the quality of counseling performance ("how"). In a randomized controlled trial, only the combination of feedback and coaching allowed MI trainees to increase their clients' change talk (Miller, Yahne, Moyers, Martinez & Pirritano, 2004). Therefore, feedback systems based on coding of MI counseling sessions are essential to facilitate training and improvement of MI competence (Moyers, Manuel & Ernst, 2014).

In the Nordic countries, MI is recommended as a counseling style in healthcare and social services, and many professionals are offered MI training either as part of their professional education or continuous professional development (Socialstyrelsen, 2020). In Norway the Directorate of Health delegated MI Analysis, KoRus Vest the responsibility to coach professionals who use MI in clinical work and wish to develop their competence in counseling. The MI Analysis KoRus Vest base their evaluation of MI competence in clinical sessions on validated coding manuals. As far as we know, no similar coding manuals are developed to study the quality of SDT-based counseling. The similarities and differences between MI and SDT have been described and discussed on a theoretical and conceptual basis (Deci & Ryan, 2012; Miller & Rollnick, 2012; Patrick & Williams, 2012). Patrick and Williams (2012) called for empirical research, stating that: *research is needed to empirically test the overlap and distinctions between SDT and MI and to determine the extent to which these two perspectives can be combined or co-exist as somewhat distinct approaches* (Patrick & Williams, 2012). To our knowledge such research has not yet been undertaken.

In the present empirical study, we have explored how quality aspects in MI sessions and clients' motivational statements corresponded with counselors' support of autonomy, competence and relatedness as described in SDT. First, we examined the reliability of MI- and SDT coding by interrater agreement and described how we mutually reached full agreement on the coding. Second, we explored the internal reliability of the constructs used in MI coding, and reported descriptive data with mean, median, standard deviation, variance and skewness for all variables used in comparisons between MI- and SDT-derived codes. Finally, we compared the measures derived from SDT- and MI coding in order to reveal commonalities and differences between the two counseling perspectives.

MATERIALS AND METHODS

Participants

We analyzed 20 transcripts submitted to MI Analysis, KoRus Vest, Norway during a period from April 2012 to October 2016. We included transcribed text of 20 min recordings of counseling sessions from different healthcare contexts: a specialized addiction treatment clinic (n = 7), child health centers (n = 5), and Healthy Life Centers (n = 8). Healthy Life Centers offer individual and group-based behavioral change interventions focusing mainly on promotion of healthier diet, physical activity and smoking cessation (The Norwegian Directorate of Health, 2016). The counselors at child health centers advised parents on risk prevention and health promotion. All counselors had received at least 11 h, mean (M) 31, range 11–42, of MI training prior to submitting the transcripts as part of their MI training. One of the counselors and seven clients were men. We have provided more information about the clients and counseling settings in Table 1.

Table 1. *Information about 20 clients included in the study, per gender, setting and aim of counseling*

Client	Gender	Setting	Change objective
1	Man	Healthy life centre	Smoking cessation
2	Woman	Healthy life centre	Increase physical activity
3	Woman	Healthy life centre	Smoking cessation
4	Man	Healthy life centre	Weight reduction
5	Woman	Healthy life centre	Improve diet
6	Woman	Healthy life centre	Weight reduction
7	Man	Healthy life centre	Smoking cessation
8	Woman	Healthy life centre	Weight reduction
9	Woman	Child health centre	Improve sleep
10	Woman	Child health centre	Increase physical activity
11	Woman	Child health centre	Increase physical activity
12	Woman	Child health centre	Weight reduction
13	Woman	Child health centre	Regulate leisure time
14	Man	Addiction clinic	Alcohol addiction
15	Woman	Addiction clinic	Increase physical activity
16	Man	Addiction clinic	Alcohol addiction
17	Man	Addiction clinic	Smoking cessation
18	Unknown	Addiction clinic	Increase physical activity
19	Woman	Addiction clinic	Smoking cessation
20	Man	Addiction clinic	Alcohol addiction

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Research design

We applied a mono-strand conversion mixed methods design as described by Teddlie and Tashakkori (2009). Transcripts of MI sessions were transformed into quantitative data according to coding manuals and analyzed quantitatively.

Measures

MI analysis. Counselors' use of MI was evaluated using the motivational interviewing treatment integrity code version 3.2.1 (MITI) (Moyers, Rowell, Manuel, Ernst & Houck, 2016). The MITI captures to what extent counselors follow both "technical" and "relational" components of MI, with coders rating a number of dimensions (see below) on five-point Likert scales. The MITI used here has been translated into Swedish, and has acceptable reliability and validity (Forsberg, Kallmen, Hermansson, Berman & Helgason, 2007, 2008). Global scores capture the rater's global impression or overall judgment about four dimensions rated on a five-point Likert scale.

Promoting change talk in MI. The construct is a summary score (divided by two) of codes assigned "cultivating change talk" and "softening sustain talk," and is most often called "global technical score" in MI.

Promoting relation in MI. Codes pertaining to "offering partnership" and "expressing empathy" are summed and divided by two. The internal consistency of these two constructs were satisfactory (Cronbach's alpha > 0.70) as reported in Table 2.

Codes of behavior counts capture specific behaviors without regard to how they fit into the overall impression of the counselor's use of MI.

MI-adherent behaviors (MI Plus) include scores on codes assigned "affirm," "seeking collaboration," and "emphasizing autonomy."

MI non-adherent behaviors (MI Minus) include scores on codes assigned "persuade without permission" and "confront." Both constructs are summary scores. Table 2 reveals that MI Plus has unsatisfactory internal consistency, and most of the codes of this measure were codes pertaining to affirming (validating) clients' utterances. The Cronbach's alpha of MI Minus is 0.62, but the inter item correlation between the two items (0.44) is so high that it should be considered a reliable construct.

Codes assigned "giving information," "persuade with permission," "question," "simple reflections," and "complex reflections" are also counted as behavior codes. High-quality MI counseling should contain more reflections than questions from the counselor. Therefore, we have included a measure called *Ratio Reflections/Questions*. Also, complex reflections characterize MI competence, and we have included *Ratio Complex Reflections/All Reflections* as a quality measure in this study as reported in Table 2 (Moyers *et al*., 2016).

Client language coding. Clients' language use within MI sessions was assessed with the client language assessment in motivational interviewing (CLAMI). This is a segment of the more extensive coding manual motivational interviewing skills code (MISC) that assess client language within MI sessions (Miller, Moyers, Manuel, Christopher & Amrhein, 2008). CLAMI contains codes assigned as positive or negative, depending on whether the utterance reflects inclination toward (+) or away from (−) the target behavior change. Client language in favor of change is assigned "change talk," while language not indicating change is called "sustain talk." The codes assigned either "change talk" (+) or "sustain talk" (−) are "reasons" with sub codes as "desire," "ability," and "need." The codes "other," "taking steps," "commitment," and "follow/neutral" also indicate an inclination toward the target behavioral change. Accordingly, we have

Table 2. *Measures used for comparisons between self-determination theory derived coding and motivational interviewing derived coding*

Variables	Mean/ Median	Min – Max	*SD*	Skewness	Cronbach's alpha
MI Provider codes					
Ratio complex/all reflexions	0.52/0.50	0.3–0.8	0.1	0.6	
Ratio reflexions/questions	1.4/0.9	0.2–4.7	1.3	1.8	
MI plus	5.5/3.5	0–28	6.3	2.6	0.01
Affirm	3.5/1.5	0–26	5.8	3.3	
Seeking collaboration	1.7/1.0	0–7	2.1	1.5	
Emphasizing Autonomy	0.4/0.0	0–1	0.5	0.7	
MI minus	0.2/0.0	0–2	0.5	2.7	0.62
Persuade without permission	0.1/0.0	0–1	0.3	2.9	
Confrontations	0.1/0.0	0–1	0.3	2.9	
Promote change talk	3.7/3.5	2–5	0.7	−0.5	0.73
Cultivate change talk	4.0/4.0	2–5	0.9	−0.9	
Soften status quo talk	3.5/3.5	2–5	0.8	−0.2	
Promote relation	4.0/4.0	3–5	0.7	−0.1	0.85
Express empathy	4.0/4.0	3–5	0.7	0.0	
Invite partnership	4.0/4.0	3–5	0.8	0.1	
SDT Provider codes					
Autonomy support	16.4/14.0	3–36	9.0	0.8	
Competence support	14.2/13.0	2–46	10.7	1.7	
Relation support	22.5/22.0	4–45	10.8	0.2	
MI client codes					
Share change talk/total codes	0.27/ 0.27	0.06–0.54	0.13	0.3	
Share neutral/total codes	0.64/ 0.67	0.32–0.86	0.17	−0.4	
Share status quo talk/total codes	0.09/0.06	0.00–0.32	0.10	1.3	
Ratio change talk/status quo talk	7.2/4.0	0.3–32	8.3	1.8	
SDT client codes					
Share autonomy codes	0.51/0.55	0.1–1.0	0.3	−0.07	
Share controlled codes	0.31/0.29	0.0–0.8	0.2	0.6	
Amotivation codes	0.18/0.12	0.0–0.7	0.2	1.3	

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entered the following constructs from the CLAMI coding: *"Share change talk/total codes," "Share neutral/total codes," "Share status quo talk/total codes," and "Ratio change talk/status quo talk."*

SDT analysis. For the purpose of this study, we developed a coding manual to identify if the counseling behavior supported the basic psychological needs for autonomy, competence and relatedness (Ryan *et al.*, 2008). The following constructs were developed for providers' verbal behavior: "Autonomy support," "Competence support," and "Relation support."

The client's motivation for change was assigned as either autonomous regulation, controlled regulation or amotivation (Appendix 1). As client coding in MI was reported as shares, we also divided the SDT codes with total codes. We applied the following constructs: "Share autonomous codes," "Share controlled codes," "Share amotivation codes," according to the three motivational regulations in SDT. Table 2 reports the descriptive statistics of these regulations. In Appendix 2 we have illustrated how MI coding and SDT coding of clients' and counselors' utterances were performed.

Coding and quantification of data. Two trained MI supervisors at MI Analysis KoRus Vest coded each transcript individually according to MITI and CLAMI coding manuals and agreed on coding in 75% [95% CI = 73, 77] of the 1,323 units from 14 main characteristics. They involved another supervisor if disagreement about coding occurred. During this process full agreement was reached. Two researchers (EA and EM) with protracted experience with SDT-based interventions in clinical practice, coded each transcript individually according to the developed coding manual, and agreed on coding in 77% [75, 80] of the 1,255 units belonging to 12 specific characteristics. The researchers discussed the remaining codes until full agreement was reached. Code counts from MITI, CLAMI and SDT-coding were included in quantitative analyses. We decided to use only the plus codes in SDT coding as these outnumbered minus codes and had higher initial agreement. The MI coders were blinded for the SDT coding and vice versa.

Statistical analyses. We have presented provider MI behavior scores as ratios and summary scores computed from MITI code frequencies, and summary scores of provider codes from SDT coding. SDT-related counselor behavior is presented as summaries of counselor language supporting autonomy, competence or relatedness. Client behavior scores in MI coding are presented as shares of codes representing change talk, status quo talk and neutral talk, and ratio of change talk codes to status quo talk codes (Glynn & Moyers, 2012). We have presented SDT coding of client language as share of codes representing clients' autonomous motivation, controlled motivation or amotivation. We tested summary scores and multi-items constructs for internal consistency with Cronbach's alpha.

We applied bivariate correlation analysis to examine correspondence of quality in MI counseling and SDT-based counseling. We also examined to what extent provider language was correlated with client language. Due to skewness > 1.0 of several of the items, we performed Spearman's rho analyses with two-sided significance testing. In statistical analyses, we applied SPSS software version 24.0 (SPSS Inc., Chicago, IL). Statistical significance was accepted at the 0.05 level.

Ethics

All counselors signed an informed consent on participation in the study. The counselors had removed all possible identification of clients before they submitted the transcripts to MI Analysis. The Regional Committee for Medical and Health Research Ethics approved the study (no 228454).

RESULTS

Assessment of counselors' needs support

We identified extensive use of decisional balance, a client-centered tool to acknowledge ambivalence and support relation and autonomy. Providers focused less on establishing commitment to behavior change in counseling. Accordingly, the distribution of the different needs support from the providers showed predominance of SDT-codes reflecting relatedness support with mean value 22.5 [95% CI 17.7, 27,3], followed by 16.4 [12.4, 20.4] reflecting autonomy support, and 14.2 [9.4, 19.0] reflecting competence support. We see that the mean value for relational support is not included in the CIs for neither autonomy – nor competence support.

Are MI- and SDT-derived codes of verbal behavior related or not?

Provider codes. We have presented correlation analyses of MITI and SDT coding of counselor's language in Table 3. SDT codes reflecting relational support correlated strongly to the promote relation score in MI (r = 0.56) and the MI plus score (r = 0.63), and also to the ratio of reflections to questions (r = 0.55). Relation support correlated moderately and statistically significant also with promote change talk summary score in MI (r = 0.45), and also with the emphasize autonomy component in MI coding (r = 0.46). Evident from Table 3 is also that competence support in SDT were moderately and statistically significant correlated with MI plus (r = 0.48) and borderline significant with the ratio of reflections to questions (r = 0.41). SDT quality measures reflecting autonomy support correlated only weakly with nearly all MI derived provider codes.

Codes for clients' responses. In Table 4 client behavior scores in MI coding are presented along with SDT coding of client's language. SDT codes representing client autonomous motivation correlated moderate negatively to share of status quo talk (r = −0.49), and strongly positive to ratio change talk to status quo talk (r = 0.56) in MI coding. Amotivation in client SDT coding correlated strongly with share of status quo talk (r = 0.51) and negatively with ratio of client change talk to status quo talk (r = −0.59). SDT codes indicating controlled client motivation were mostly not correlated with any of the client MI-coding.Does providers' need support correspond with clients' inclination to change?

We examined to what extent provider verbal behavior was associated with client behavior. The associations were weaker especially concerning provider behavior codes in SDT and client

Table 3. *Correlations between SDT-derived and MI-derived provider codes, reported with Spearman rho-values with significance level*

	SDT codes		
	Autonomy support	Competence support	Relation support
MI codes			
Emphasize Autonomy	0.16	0.25	0.46*
Ratio complex reflections/all reflections	0.10	−0.09	0.19
Ratio reflections/questions	−0.35	0.41	0.55*
MI plus	−0.10	0.48*	0.63**
MI minus	−0.17	0.14	0.12
Promote change talk	0.08	0.05	0.45*
Promote relation	0.17	0.17	0.56*

Note: *p < 0.05; **p < 0.01.

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Table 4. *Correlations between SDT-derived and MI-derived client codes, reported with Spearman rho-values with significance level*

	SDT codes		
	Share autonomous motivation	Share controlled motivation	Share amotivation
MI codes			
Share change talk/total codes	0.24	0.02	−0.33
Share neutral/total codes	−0.05	−0.05	0.08
Share status quo talk/total codes	−0.49*	0.13	0.51*
Ratio change talk/status quo talk	0.56**	−0.16	−0.59**

Note: $*p < 0.05$; $**p < 0.01$.

Table 5. *Associations between provider verbal behavior (MI) and client motivation (SDT), reported with Spearman rho-values and significance level*

	SDT client codes		
	Share autonomous motivation	Share controlled motivation	Share amotivation
MI provider codes			
Emphasize Autonomy			
Ratio complex reflections/all	$-0.39^{\#}$	−0.08	0.51*
Ratio reflections/ questions	−0.18	0.21	−0.02
MI plus	$0.41^{\#}$	−0.24	−0.30
MI minus	−0.11	−0.08	0.23
Promote change talk	0.48*	−0.29	−0.34
Promote relation	0.11	−0.08	−0.04

Note: $^{\#}p < 0.10$; $*p < 0.05$.

verbal behavior in MI. A borderline significant ($p < 0.10$) correlation was revealed between relational support (SDT) and ratio change talk/ status quo talk ($r = 0.38$) (not shown in table).

Greater associations were revealed for how provider verbal behavior according to MI was related with client motivational self-regulation in SDT, as seen in Table 5. Complex reflections were used statistically significant more often with amotivated clients ($r = 0.51$), and borderline significant less often with autonomous motivated clients ($r = -0.39$). MI-plus provider behavior was borderline significant associated with client autonomous motivation ($r = 0.41$), and providers' promotion of change talk correlated statistically significant with autonomous motivation (0.48).

DISCUSSION

The present study supported the relation between counselors' MI and SDT counseling quality, especially for relational support. The relation was also supported for clients' language, demonstrating how autonomous motivation and change talk were inter-related, and how amotivation was related to status quo talk. We also revealed that counselors put strong emphasis on relation support, whereas supporting competence was less emphasized.

Both MI and SDT strongly advise that behavior change counseling should foster internalization of motivation and self-determined and volitional behavior. The two perspectives of counseling have conceptual overlap and can be viewed as complementary (Patrick & Williams, 2012; Vansteenkiste & Sheldon, 2006). The present empirical study is, to our knowledge, the first clinical study that supports this claim that researchers previously have arrived at from theoretical and analytical perspectives only. A recent meta-analysis and meta-regression analysis supported that autonomy-supportive and client-centered counseling predicted long-term maintenance of behavior change (Samdal, Eide, Barth, Williams, & Meland, 2017). Therefore, the results from our study are clinically relevant as it supports that internalization of motivation can be evaluated from two complementary approaches.

MI counseling has been confused with attending only to clients' ambivalence and acknowledging the tension between opposing needs and intentions in a relational-supportive manner. This is very relevant when clients are contemplating on performing change, and when they are mostly indifferent about change. Revealing ambivalence is, however, less suited when clients have decided to change (Miller & Rollnick, 2009, 2013). The meta-analysis referred above showed that "pro-and-contra-talk" had no effect on long-term health behavior change, but several techniques for strengthening self-regulation of new behavior were related to success (Samdal et al., 2017). The findings of our study may also serve as a reminder that continuing education of counselors should build competence in documented behavior change techniques for self-regulation when the clients express readiness to change or are accomplishing behavior change.

Effective behavior change counseling contains components that must be learned and updated, in line with Miller *et al*. (2004), who found that a combination of feedback and coaching in MI increased clients' change talk, a reliable antecedent of behavior changes. We identified that counselors extensively explored and reflected on ambivalence. This was previously part of MI counseling but is no longer recommended as it does not facilitate commitment to behavior change (Miller & Rollnick, 2009).

In order to build MI competence proficiency thresholds have been introduced. These thresholds are based upon expert opinion, and the developers of MITI underscore that there is currently a lack of normative or other validity data to support them (Moyers *et al*., 2014). In the present study we abstained from using threshold scores.

We revealed that the correlation between the autonomy concepts from the two perspectives was low and statistically insignificant. In SDT, volition is the important antecedent of effective change, and a communication style based on SDT that aims to support autonomy, is relevant also when clients volitionally decline from behavior change (Deci & Ryan, 2012). Moreover, MI is a goal-directed style of communication, and behavior change is always the goal (Miller & Rollnick, 2009). Emphasizing autonomy in MI coding is only acknowledged when it is linked to the target behavior change. Therefore, the lack of congruence is explained by conceptual divergence. Counselors should be aware of this difference in conceptualization of autonomy. In addition, the MI-derived "emphasizing autonomy"

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code was rarely noted from the counseling in the present study, and the correlation analysis may be improper.

The dilemmas concerning how autonomy support should be performed are extensively explored by Herlitz *et al*. (2016). The assumption of independent and self-determined individuals who are fully able to engage in rational deliberation, choose among options, and adhere to self-determined action plans is at best an idealization of reality in most clinical situations. Therefore, the standard conceptualization of person-centered care and shared decision making may be insufficient and possibly counter-productive. A model based on counseling, self-care and adherence seems more realistic and productive. In accordance with this, the before mentioned meta-analysis revealed that autonomy support combined with self-regulation- and adherence support were mutually important (Samdal *et al.*, 2017).

As expected, client's autonomous motivation correlated negatively to client's status quo talk and positively to client's change talk. This is in line with assumptions of conceptual overlap between SDT and MI (Patrick & Williams, 2012). Also, the finding that amotivation correlated negatively to change talk and positively with status quo talk can be interpreted as a manifestation of conceptual overlap.

We also revealed that counselors in the present study adapted their language according to the clients' motivational regulation. Complex reflections were used increasingly with clients' amotivation and decreasingly with autonomous motivation (the latter only borderline significant). Autonomous regulation was also statistically significant correlated with providers' promotion of change talk. We maintain that also these findings were manifestations of conceptual overlap.

Strengths and limitations of the study

The SDT coding procedure used in the present study is novel and derived from key SDT concepts for the purpose of this study. To our knowledge, this is the first empirical study testing the conceptual relationship between MI and SDT. We maintain that the validity of the SDT coding was safeguarded as commonalities and differences were clinically explainable and analytically supported.

We acknowledge that our study had an insufficient number of counseling sessions, leading to insufficient statistical power. Correlations had to reach 0.45 in order to reach statistical significance. Therefore, correlations that were moderate and probably relevant from a clinical point of view, did not reach statistical significance due to type 2 errors.

In the present study we revealed unsatisfactory internal consistency of the summary score MI plus. This is a hierarchical summary construct with counts of affirmation plus counts of seeking collaboration plus counts of emphasizing autonomy. As can be seen in Table 1, counts of affirmation outnumbered by far the two other verbal behaviors, and expressed first and foremost providers validating utterances from clients. This is probably the explanation for the high correlations with relation support and competence support in SDT coding.

We had only access to 20 min transcripts of the counseling sessions selected by the trainees. Thus, we missed information concerning non-verbal communication, voice tone, inflection and pace. When client language is of interest, it is recommended to include the entire MI session so that dynamic patterns of this kind are captured (Miller *et al*., 2008). Video recordings of the entire counseling session would have provided more information, but this method is more intrusive and not at present available to MI trainees in Norway.

CONCLUSION

Despite discrepancies between MI and SDT derived coding, this study supported a conceptual relationship between the two perspectives of counseling. This holds true both for clients' and counselors' verbal behavior. The study provides evidence that the quality of MI counseling in healthcare is related to self-determination, but also that autonomy support and goal-directedness are differently emphasized. Counseling based on MI and SDT may be used complementarily.

The authors appreciate that the counselors were willing to share their transcripts.

CONFLICT OF INTEREST

All authors declare that they have no competing interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in the Norwegian Centre for Research Data at https://www.nsd.no/en/about-nsd-norwegian-centre-for-research-data/, reference number 228454.

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APPENDIX 1

Examples of how the counselor supports the clients' psychological needs satisfaction, according to Self-determination Theory (SDT), autonomy, competence and relation

Autonomy	Counselor stimulates reflection that supports internalisation of motivation. Let the client choose, stimulates creative solutions. What is appropriate to do for you right now?
Competence	Questions that support self-efficacy. Empowerment. Objective competence-building information when requested. Supports regulation skills. Utterances that stimulates commitment to action.
Relation	Gives space for the client. Signalizes cooperation. Asks for permission. Checks out own interpretations and mutual agreement. Express empathy and acknowledge difficulties in behaviour change. Accepts diverging perceptions in a non-judgmental way.

Examples of how clients' utterances are coded according to type of regulation and type of motivation, defined by Self-determination Theory (SDT).

Type of motivation	Regulatory styles	Examples of utterances
Autonomous motivation		
	Intrinsic	I look upon myself as a person that take responsibility for my health.
	Identified	I find it challenging and fun to involve in health promotive activities.
	Integrated	
Controlled motivation	Introjected	I was sent to this counseling by my spouse.
	External	It fills me with bad conscience if I do not live up to the goals that I have.
Amotivation		I have been unsuccessful so many times that there is no use in trying once more.

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APPENDIX 2

Examples of how counselor's and client's utterance are coded using Motivational Interviewing Treatment Integrity Code version 4.2.1 (MITI), Client Language Assessment in Motivational Interviewing (CLAMI) and according to Self-determination Theory (SDT); counselors supporting client's basic psychological needs and per type of clients' motivation.

	Counselor utterance		Client utterance	
Quotations	MITI	SDT (Three basic needs)	CLAMI	SDT coding (Type of motivation)
Client: Well, I don't really know. I am fed up.			Neutral	Controlled motivation
Counselor: Yes. You are fed up.How fed up are you with alcohol?	Simple			reflectionQuestion
(no coding)Competence+				
Client: About as fed up as one can be.			Reason+	Controlled motivation
Counselor: So, when you feel fine, without anxiety, or with anxiety you can cope without alcohol, it feels fine…	Complex reflection	Relation+		
Client: Yes.			Reason+	(no coding)

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