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Towards an understanding of self-directed language as a mechanism of behavior change: A novel strategy for eliciting client language under laboratory conditions

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ABSTRACT

Introduction: Change talk (CT) and sustain talk (ST) are thought to reflect underlying motivation and be important mechanisms of behavior change (MOBCs). However, greater specificity and experimental rigor is needed to establish CT and ST as MOBCs. Testing the effects of self-directed language under laboratory conditions is one promising avenue. The current study presents a replication and extension of research examining the feasibility for using simulation tasks to elicit self-directed language.

Methods: First-year college students ($N = 92$) responded to the Collegiate Simulated Intoxication Digital Elicitation, a validated task for assessing decision-making in college drinking. Verbal responses elicited via free-response and structured interview formats were coded based on established definitions of CT and ST, with minor modifications to reflect the non-treatment context. Associations between self-directed language and alcohol use at baseline and eight months were examined. Additionally, this study examined whether a contextually-based measure of decision-making, behavioral willingness, mediated relationships between self-directed language and alcohol outcome.

Results: Healthy talk and unhealthy talk independently were associated with baseline alcohol use across both elicitation formats. Only healthy talk during the free-response elicitation was associated with alcohol use at follow up; both healthy talk and unhealthy talk during the interview elicitation were associated with 8-month alcohol use. Behavioral willingness significantly mediated the relationship between percent healthy talk and alcohol outcome.

Conclusions: Findings support the utility of studying self-directed language under laboratory conditions and suggest that such methods may provide a fruitful strategy to further understand the role of self-directed language as a MOBC.

1. Introduction

As part of a larger movement to understand the causal processes by which behavioral treatments for substance use problems lead to desired outcomes, researchers have begun investigating a number of mechanisms of behavior change (MOBCs), or factors hypothesized to drive changes in substance use (Magill, Kiluk, McCrady, Tonigan, & Longabaugh, 2015). Self-directed verbal statements about one's own substance use have been identified as a potentially important MOBC. Specifically, two dimensions of self-directed language have been investigated: change talk (CT), or statements supporting movement towards healthy behavior, and sustain talk (ST, previously known as counterchange talk), or statements supporting maintenance of unhealthy behavior. Self-directed language as a MOBC largely has been studied in the context of motivational interviewing (MI: Miller & Rollnick, 2013) as it is hypothesized to be central to MI's effectiveness, but the influence of self-directed language is by no means unique to MI. CT and ST have almost exclusively been studied in therapeutic settings despite the potential utility and value of examining self-directed language in other contexts. The purpose of the current study is to examine the ability to validly elicit CT and ST under laboratory conditions using a simulation task as a novel technique for studying self-directed language as a MOBC independent of the therapeutic context. Doing so could be useful for a number of reasons.

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First, the issue of whether self-directed language represents a true MOBC or serves as a proxy for another underlying mechanism (e.g., motivation) remains unanswered. Laboratory tests of self-directed language could serve to help establish the experimental criterion for demonstrating self-directed language as a MOBC (Kazdin & Nock, 2003). Additionally, the measurement of self-directed language has been largely atheoretical (Miller & Rollnick, 2012) and divorced from the larger theoretical literature on determinants of motivation and health decision-making. For example, a considerable body of literature suggests decision-making occurs via dual processes (e.g., Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008; Kahneman & Frederick, 2002; Slovic, Finucane, Peters, & MacGregor, 2004). While differing in terminology, a number of theories posit two systems underlying decision making: a deliberative, rational system and an experiential, reactive system. By studying the impact of client language elicited during therapeutic interventions, researchers may be isolating aspects of the rational system, but likely missing out on the influence of the experiential system (i.e. contextually-bound decision making). Isolating the specific mechanisms of self-directed language could serve the larger decision-making literature by exploring for whom and under which conditions self-directed language is most impactful upon future choices regarding alcohol use.

Relatedly, while studying self-directed language in therapeutic settings is important, it also restricts the study of MOBCs to a specific range of the change spectrum, which may limit understanding of the conditions under which self-directed language leads to behavior change (Morgenstern et al., 2012). To this end, expanding the study of the link between self-directed language and health behavior beyond the therapeutic milieu could inform efforts to utilize such verbal behavior in other health applications (e.g., early detection and assessment of risk, prevention techniques, public and/or individualized health messaging). Finally, studying self-directed language outside the therapeutic environment also eventually may serve to inform provision of clinical services by refining the understanding of self-directed language as a MOBC in general “talk therapy.” As outcome equivalence has been found across differing treatment modalities with various proposed mechanisms of change (Longabaugh, 2007), understanding the importance of self-directed language and the role the individual or therapist has on self-directed language and subsequent behavior change may enhance treatment efficacy and effectiveness.

One strategy with the potential to further refine our understanding of self-directed language is the use of laboratory-based simulation paradigms. Self-directed language traditionally assessed in therapy contexts is distal and decontextualized from the situations in which individuals make decisions about drinking. The use of simulations enhances the ability to model more proximal drinking decision making, as well as the ability to examine these processes among individuals who other methods of assessing proximal decision making can be more difficult due to ethical and/or legal considerations (e.g., individuals under the age of 21). As the first of its kind, Ladd, Garcia, and Anderson (2016) demonstrated the potential for studying self-directed language elicited during a laboratory task. This cross-sectional study utilized the Adolescent Simulated Intoxication Digital Elicitation (A-SIDE: Anderson et al., 2014) in a sample of adolescents aged 14–18, a paradigm wherein participants respond verbally to videos of simulated substance use scenarios. Results demonstrated that self-directed language could be reliably coded using definitions consistent with CT and ST. Self-directed language was also associated with behavioral willingness (BW), or openness to engage in a behavior given the opportunity to do so (Pomery, Gibbons, Reis-Bergen, & Gerrard, 2009), but not concurrent substance use.

The current study attempted to replicate and extend the feasibility of using simulation tasks as a method for assessing self-directed language under laboratory settings by building on the findings of Ladd, Garcia, et al. (2016) in a sample of first-year college students. The majority of high school seniors report using alcohol in the past year and almost a quarter report binge drinking in the past two weeks (Patrick & Schulenberg, 2014), thus first-year college students represent a population across the spectrum in terms alcohol behavior change. The first year of college is an important timeframe during which young adults make short-term (e.g., what to do on Friday night) and long-term (e.g., identity formation) decisions around alcohol, making this population a useful target for studying self-directed language as a MOBC. We hypothesized that in response to simulated drinking situations, self-directed language related to alcohol use could be reliably categorized into healthy talk and unhealthy talk, using definitions largely consistent with the larger body of research on self-directed language. As noted previously, definitions of CT and ST were developed for treatment contexts where the need for change towards healthier behavior was assumed. Given the non-treatment context of the current study, the desire/expectation of change may not be applicable in many cases. Accordingly, we modified the definitions of CT and ST slightly to better reflect underlying psychological processes (e.g., motivation, attitudes) related to approaching or avoiding alcohol use similar to previous extensions of client language measurement beyond the treatment context (Ladd, Garcia, et al., 2016; Ladd, Tomlinson, Myers, & Anderson, 2016). Modifications to the traditional measures of CT and ST are described in detail in the coding procedures Section 2.2.1 below. Additionally, the current study utilized longitudinal data that allowed for the investigation of associations between self-directed language elicited in the laboratory and subsequent alcohol use. We hypothesized that greater rates of healthy talk at the beginning of the academic year in college freshmen would be associated with lower alcohol use 8 months later while greater rates of unhealthy talk would be associated with greater alcohol use.

We also conducted exploratory analyses to examine self-directed language within a broader framework of dual-process decision making as a potential avenue for understanding contexts under which self-directed language better predicts behavior. According to one specific model, the prototype-willingness model (Gibbons & Gerrard, 1995; Gibbons, Gerrard, Blanton, & Russell, 1998), risk behavior decision-making occurs via two parallel pathways: a distal reasoned one and a proximal nondeliberative one. As measured in therapeutic contexts, self-directed statements about alcohol represent conscious reflections of one's behavior decontextualized from the immediate decision-making process, and thus are unlikely to lead directly to behavior change; instead it is more plausible that self-directed language is a distal variable that mobilizes other factors related to in-the-moment behavior. Using this conceptualization, self-directed language could be a measurement of the intentional and reasoned pathway, while BW represents a measure of the nondeliberative pathway (Gibbons et al., 1998). We hypothesized that the relationship between self-directed language and alcohol use would be mediated by BW. In other words, talking about one's goals and behavior abstractly may serve to reduce the impact of context-based factors on decision-making, thereby resulting in behavior change.

2. Methods

2.1. Participants

We utilized data from the validation study of the Collegiate Simulated Intoxication Digital Elicitation (C-SIDE: Anderson, Duncan, Buras, Packard, & Kennedy, 2013), which consisted of transcripts of verbal responses to the simulation (94% of original sample, loss of data due to inaudible recordings and/or mechanical failure of recording device). First year college students (N = 92) were recruited within the first few weeks of the school year (M_{days} = 12.1, SD = 8.8). The sample was M = 18.6 (SD = 0.4) years old, 59.8% women (n = 55) and predominantly White (81.5%, n = 75).

2.2. Procedure

Participants were recruited via fliers and tabling at orientation events at three campuses located in the U.S. Pacific Northwest. To be eligible, interested individuals had to be first-year college students, between the ages of 18–20, and report drinking in the past 30 days. Upon presenting for the baseline assessment, participants first provided informed consent and then completed the C-SIDE task alone in a private space. The C-SIDE was designed to evaluate context-based decision-making using simulated audio scenes of common college drinking scenarios. It is important to note that the C-SIDE was designed as an assessment paradigm, not an intervention technique, and participants were recruited and consented accordingly. The C-SIDE is similar to the A-SIDE used in Ladd, Garcia, et al. (2016) and Ladd, Tomlinson, et al. (2016), except that the scenes were based on typical drinking situations experienced by college students rather than high school aged adolescents, included only alcohol offers as the substance of interest, and used audio stimuli. Audio stimuli have the benefit of allowing participants to imagine their own friends and local environments of use, as compared to video simulations where visual cues allow for assessing cue reactivity in clinically-involved samples. Participants were seated alone in front of a computer in an interview room and instructed to imagine they were in the situations presented. After being oriented to the task via two practice audio scenes, participants listened to five different drinking situations in randomized order. The C-SIDE scenes include a preloading scenario (drinking before going to a concert), a small gathering in dorm room, a 21st birthday house party, and two situations where drinking games (beer pong at a large party and small party based around drinking during a movie) were being played. During each scene, participants are offered various alcoholic beverages (beer, shots, mixed drinks) and control offers (water, soda, food). After each offer, participants responded verbally via a brief open-elicitation modeled on the Articulated Thoughts in Simulated Situations paradigm (ATSS: Davison, Vogel, & Coffman, 1997) before continuing on with the scene. This open-elicitation was designed to allow for concurrent context-based assessment wherein participants were prompted by the computer to think aloud for up to 30 s. At the end of each scene, participants indicated their willingness to accept each offer made within that context on a Likert scale presented on the computer before going onto the next scene. For more information on the development and validation of the C-SIDE task, see Anderson et al. (2013).

Upon completion of the C-SIDE, trained gender-matched research assistants conducted a structured interview to gather further information about participants' reactions and thoughts about the various scenes (e.g., “What stood out to you in that situation?”, “What do you want to have happen in this situation?”). Then participants completed a self-report assessment battery including demographics information, alcohol use and consequences, as well as different alcohol-related cognitions. Participants were compensated for their time and reminded about the follow-up assessment. Eight months after the baseline session, participants were contacted via email and provided a link to an online alcohol use survey. This timeframe was identified to reflect the end of the freshman year. The follow up completion rate was 90.2% (n = 83) for the current sample. All study procedures were approved by the relevant institutional review boards.

2.2.1. Self-directed language coding procedures

All verbal statements elicited during the open-elicitation and structured interview were audio-recorded and transcribed. Self-directed language was rated using the Manual for the Motivational Interviewing Skill Code 2.1 (MISC: Miller, Moyers, Ernst, & Amrhein, 2008). For the current study, only the frequency of codes was rated; strength ratings were not assessed. Definitions of change talk and sustain talk were consistent with the MISC categories, with two slight modifications. First, verbal responses to the simulated CSIDE scenarios were coded as situations participants would encounter in their own lives. Second, CT and ST were re-conceptualized as healthy talk or unhealthy talk based on whether utterances indicated movement towards or away from the target behavior of alcohol use, rather than towards or away from a *change* in the target behavior. Thus, statements in favor of avoiding alcohol, such as those promoting reductions in drinking or supporting abstinence from alcohol were categorized as healthy talk; examples include: “if the assignment is due and I really need to work on it, then I just wouldn't go (to the party)” and “I could go there and not drink, just hang out with people.” Statements supporting drinking or increases in alcohol use were categorized as unhealthy talk; examples include: “I would take the vodka shot” and “I would want to be buzzed, it's not fun to be the only sober person.” Consistent with the MISC 2.1 procedures, healthy and unhealthy statements were further categorized into four subcodes: Reason, Other, Taking Steps, and Commitment. These subcodes are presented only for descriptive purposes, the superordinate categories of healthy talk and unhealthy talk were of primary interest for the current analyses. Statements not falling into the healthy or unhealthy categories were defined as follow/neutral.

Three undergraduate coders were trained on the MISC. First coders were oriented to the MISC manual and definitions of self-directed language. Then the coding team went over examples of healthy talk and unhealthy talk using worksheets. Finally, coders rated practice sessions until an acceptable level of inter-rater reliability was obtained. Coders then rated transcripts of participants' verbal responses to the C-SIDE task at the utterance level. Twenty-one percent (n = 20) of sessions were double-coded for reliability purposes (final reliability estimates are provided below in Section 3.1 Coder Reliability). One set of codes was randomly selected for each double-coded session for the final dataset.

2.3. Measures

2.3.1. Healthy talk and unhealthy talk

For the final analyses, self-directed language variables were computed by averaging the frequency of healthy talk and unhealthy talk codes per scene across the five simulated scenes. Average self-directed language counts were computed separately for each participant based on the source of elicitation (i.e. open-elicitation and structured interview). In addition to healthy talk and unhealthy talk frequencies, a composite variable, percent healthy talk (PHT), was computed. PHT was calculated as the healthy talk count divided by the sum of healthy talk and unhealthy talk counts; higher PHT indicates a greater proportion of healthy talk relative to all alcohol-related statements. Composite measures such as PCT have been associated with substance use outcomes (Magill et al., 2014), and have the added advantage of controlling for overall frequency of substance-related statements.

2.3.2. Alcohol use

At baseline, a composite quantity/frequency score was computed based on participants' response to two items asking about quantity (average drinks per drinking occasion) and frequency (days per month) of alcohol use in the 3 months prior to starting at college. Before college, participants reported consuming a mean of 27.8 (SD = 49.7) drinks per month. At 8-month follow up, a quantity/frequency score was computed representing total number of drinks consumed during a typical week and heavy drinking week based on participants' responses to how many drinks they consumed on each day of the week over the previous 30 days during a typical week, as well as during the heaviest drinking week, using items adapted from the Drinking Norms Rating Form (Baer, Stacy, & Larimer, 1991; Borsari & Carey, 2000). Participants reported consuming a mean of 6.7 (SD = 7.0) drinks during a typical week and a mean of 12.2 (SD = 13.2) drinks during their heaviest drinking week.

2.3.3. Behavioral willingness (BW)

At the end of each simulated scene, participants indicated their

willingness to accept each of the set of offers made on a five point scale (1 = not at all willing to 5 = very willing). For each participant, an average BW score was computed by averaging responses of willingness to accept all alcohol offers. This measure demonstrated acceptable internal reliability (α = 0.92) and was a significant predictor of alcohol use in the original validation study (Anderson et al., 2013). Participants reported a mean behavioral willingness score of 2.8 (SD = 1.1).

2.4. Analyses

All analyses were conducted using SPSS 24. To correct for violations of normality, alcohol use variables and self-directed language two techniques were undertaken to minimize the potential problems stemming from the distributions. Frequency counts were standardized (z-score) and extreme values ($|z| > 3$) were Winsorized. For any given variable, 3% or less of the values were affected by this transformation. Additionally, we used bias-corrected bootstrapping techniques to account for the non-normality of the data during tests of indirect effects.

Interrater reliability was assessed using individual-measures absolute agreement intraclass correlation coefficients (ICCs). Determination of reliability was based on the guidelines put forth by Cicchetti (1994) such that ICCs < 0.4 = poor, 0.4–0.59 = fair, 0.6–0.74 = good, and > 0.75 = excellent reliability.

Descriptive statistics of the self-directed language variables were examined, and paired t-tests were conducted to examine if self-directed language differed based on elicitation format. Linear regression models were used to examine whether healthy talk and unhealthy talk were associated with baseline alcohol use. Separate regression models were tested for each elicitation format. Next, regression models were conducted to examine whether self-directed language predicts alcohol use 8 months later after controlling for baseline alcohol use. Given the novelty and exploratory nature of the current study, along with the evidence that CT and ST may exert effects on behavior independently (Moyers et al., 2007), healthy talk and unhealthy talk were entered simultaneously for these models.

Mediation models were tested using PROCESS (Hayes, 2013). Specifically, PHT was entered as the independent variable, BW as the mediator, and 8-month alcohol use as the dependent variable. Baseline alcohol use was included as a covariate in all mediation models. We used bootstrapping techniques to estimate indirect effects, therefore bias-corrected 95% confidence levels are reported in lieu of significance values for indirect effects.

3. Results

3.1. Coder reliability

Interrater reliability was acceptable, ranging from fair to excellent. For the free-response elicitation, follow-neutral codes demonstrated fair reliability (ICC = 0.536), healthy talk demonstrated good reliability (ICC = 0.617), and excellent reliability for unhealthy talk (ICC = 0.809) and PHT (ICC = 0.865). Reliability estimates were largely comparable in the interview elicitation, with good reliability for follow/neutral (ICC = 0.652), fair reliability for healthy talk (ICC = 0.581), and excellent reliability for unhealthy talk (ICC = 0.953) and PHT (ICC = 0.833).

3.2. Description of elicited self-directed language

Table 1 presents the average frequency of total statements, healthy talk, and unhealthy talk per scene for each of the two elicitation formats. On average, over 40% of coded statements were classified as either healthy talk or unhealthy talk in both elicitation formats. There were significantly more coded utterances during the interview elicitation compared to the free-response elicitation. However, PHT did not differ by elicitation format. In other words, participants offered more language during the interview with a trained research assistant than when alone freely responding to the simulated scene, but were consistent in terms of the relative rate of healthy talk compared to substance-related statements across elicitation formats. Additionally, on average participants offered a balance of healthy talk and unhealthy talk as evidenced by the PHT values of roughly 50%.

In terms of the subcodes of healthy talk, the vast majority of utterances were rated as either Reasons (61% of utterances in the free-response elicitation, 47% in the interview elicitation) or Commitment (35% of utterances in the free-response elicitation, 42% in the interview elicitation). A similar pattern was observed for unhealthy talk subcodes; Reasons comprised 43% and 44% of utterances in the free-response and interview elicitations respectively, while Commitment comprised 52% and 43% of utterances in the free-response and interview elicitations respectively.

3.3. Associations between self-directed language and alcohol use

The descriptive results presented above used the raw frequency count variables. For all subsequent analyses, the standardized frequency counts variables were used. As a preliminary test of concurrent validity, when entered simultaneously healthy talk and unhealthy talk frequency counts were significantly associated with baseline alcohol use in the free-response elicitation format (Table 2). The direction of the relationships was consistent with study hypotheses; greater healthy talk was associated with lower alcohol use in the three months before college while greater unhealthy talk was associated with greater alcohol use. Considered separately, PHT was negatively associated with baseline alcohol use, $\beta = -0.44$, $p < 0.001$. Similar results were observed during the interview elicitation for healthy talk, unhealthy talk (Table 2), and PHT, $\beta = -0.37$, $p < 0.001$.

Table 2 also presents the results of self-directed language as a predictor of typical weekly alcohol use at the 8-month follow up. After controlling for baseline alcohol use, healthy talk but not unhealthy talk was significantly associated with 8-month alcohol use for the free-response elicitation. PHT was significantly associated with follow-up alcohol use, $\beta = -0.31$, $p = 0.005$. Both healthy talk and unhealthy talk were significantly associated with 8-month alcohol use for the interview elicitation. PHT during the interview elicitation also was significantly associated with alcohol use 8 months later, $\beta = -0.34$, $p = 0.001$. Although not presented, similar effects were seen in models testing heaviest drinking week at follow up.

3.4. Does behavioral willingness mediate the relationship between self-directed language and alcohol outcome?

To test the mediating effect of BW, models were examined using the composite language variable, PHT. Separate models were conducted for each elicitation format. As before, all estimates presented control for baseline alcohol use. Fig. 1 presents the mediation model with PHT during the free-response elicitation as the independent variable.

The overall model was significant, $F(2, 77) = 15.4$, $p < 0.001$, $R^2 = 0.28$. Greater PHT was associated with decreased BW, $B = -0.026$, $SE = 0.003$, $p < 0.001$. Greater BW was associated with greater 8-month alcohol use, $B = 0.332$, $SE = 0.141$, $p = 0.021$. Interestingly, when considering the mediating effect of BW, the direct effect of PHT on alcohol use was no longer significant; only the indirect effect through BW was significant (Table 3).

Since assessment of self-directed language and BW were temporally confounded (i.e. measured at the same time point), we also examined a model with BW as the independent variable and PHT as the mediator. In this model, the direct effect of BW on 8-month alcohol use was significant, $B = 0.332$, $SE = 0.141$, $p = 0.021$, while the indirect effect of BW on 8-month alcohol use through PHT was nonsignificant, $B = 0.042$, $SE = 0.098$, LL = −0.125, UL = 0.267. Thus, PHT was not supported as a mediator of the relationship between BW and 8-month

Table 1
Descriptive statistics of average self-directed language per scene by elicitation format.

	M_{open}	SD_{open}	Range	M_{intvw}	SD_{intvw}	Range	t	p
Healthy talk	2.6	2.2	0–11.2	6.2	4.0	0.6–20.4	− 12.05	< 0.001
Unhealthy talk	2.3	2.2	0–14.4	5.4	3.5	0–19.2	− 11.84	< 0.001
Total	10.5	3.9	5–28	27.9	7.1	17.6–63.8	− 28.4	< 0.001
PHT[a]	53.2	28.4	0–100	53.3	23.4	12–100	− 0.38	0.724

Note: t scores represent results from a paired t-test comparing language variables across elicitation format. Total represents the sum of healthy talk, unhealthy talk, and follow-neutral statements. Open = free-response elicitation, intvw = interview elicitation.

[a] PHT is presented as a percentage, while the other variables are frequency counts.

Table 2
Associations between self-directed language and average alcohol use in each elicitation format.

Model	Effect	Baseline		Follow up	
		β	p	β	p
Open-response	Healthy talk	− 0.33	0.001	− 0.28	0.003
	Unhealthy talk	0.25	0.013	0.16	0.112
	BL alcohol			0.32	0.003
Interview	Healthy talk	− 0.28	0.006	− 0.25	0.012
	Unhealthy talk	0.21	0.040	0.2	0.047
	BL alcohol			0.32	0.002

Note: Standardized estimates presented. Healthy talk and unhealthy talk were entered simultaneously for each separately conducted elicitation model. The dependent variable for the follow up analyses was average week alcohol use. BL = baseline.

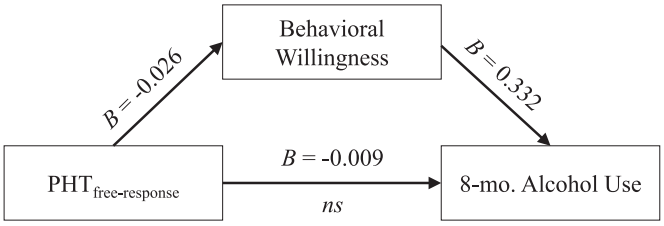

Fig. 1. Effect of PHT during the free-response elicitation on alcohol outcome through behavioral willingness.
Note: For c path (i.e. PHT to 8-mo. alcohol use), estimate above line is indirect effect, estimate below is direct. The model controls for the effects of baseline alcohol use at all points.

Table 3
Total, direct, and indirect effects of a mediation model testing effects of PHT during the free-response elicitation and BW on 8-month alcohol use.

Effect	B	SE	p	LL[a]	UL[a]
Total	− 0.011	0.004	0.005	− 0.018	− 0.003
Direct	− 0.002	0.005	0.675	− 0.013	0.008
Indirect	− 0.009	0.003		− 0.015	− 0.002

Note: PHT = percent change talk during interview elicitation, BW = behavioral willingness, LL = lower limit of 95% confidence interval, UL = upper limit of 95% confidence interval.

[a] For the indirect effect, confidence interval estimates are bias-corrected bootstrapped estimates (5000 samples). Due to the bootstrapping technique, no significance level is provided for the indirect effect.

alcohol use. Although not presented, results for the model with PHT during the structured interview elicitation as the independent variable were very similar.

4. Discussion

The results of the current study support the utility of studying self-directed language under laboratory conditions to improve our understanding of self-directed language as a MOBC. Healthy talk and unhealthy talk were reliably measured, replicating findings from Ladd, Garcia, et al. (2016) regarding the ability to elicit self-directed language variables in response to a laboratory-based simulation task. The current findings also suggest the predictive validity of self-directed language elicited under such conditions, as healthy talk and unhealthy talk were associated with concurrent and future alcohol use in a sample of first-year college students.

Unlike in the Ladd, Garcia, et al. (2016) adolescent sample, baseline alcohol use was significantly associated with self-directed language in the current sample. Due to variations in the samples and research designs, it is difficult to interpret these divergent findings. The current sample consisted of young adults entering college, while the adolescent sample consisted of community youth recruited from multiple settings, including treatment centers. Thus, the current sample may have been more consistent in terms of their use prior to study enrollment and responses to the simulated drinking situations, while there may have been greater inconsistency in the adolescent sample (i.e. some participants reporting heavy drinking prior to study enrollment were also reporting their behavior prior to engaging in treatment while others had no intention of changing). Regardless of the reasons for the differences in concurrent associations between the two studies, the results of these studies echo recent calls to explore conditional models of self-directed language (Gaume et al., 2016; Magill et al., 2014).

The current study also extends the literature by examining the predictive validity of such language on subsequent alcohol use. In this nontreatment sample, healthy talk was a consistent predictor of subsequent alcohol use across elicitation format, while the evidence for unhealthy talk was mixed. This contradicts evidence from treatment samples suggesting a more consistent effect of ST as predictor of treatment response (Magill et al., 2014). It is too early to make definitive conclusions about these seemingly contradictory findings, but they again may support the concept of conditional models. Depending on the context, a directive vs. nondirective strategy may be beneficial or detrimental in terms of behavior change (Miller & Rose, 2015). Motivational interviewing is inherently directive, which may lead to less authentic CT due to social desirability and expectations (Gaume et al., 2016). The current laboratory paradigm for eliciting self-directed language was decidedly nondirective, which may have resulted in elicitation of more genuine CT. It is possible that the relative impact of CT and ST may vary based on the nature and context of the elicitation.

The finding regarding the predictive validity of self-directed language varied by elicitation format may have implications for self-directed language as a MOBC. Free-response healthy talk predicted alcohol use 8 months later alone, while healthy talk *and* unhealthy talk during the interview were significant predictors. Perhaps the impact of self-motivational statements may differ based on context (i.e. who one is speaking with, where/when one is speaking). Given the rise in computerized interventions, this is a particularly relevant question. Perhaps there is something more powerful about talking about one's behavior with another individual versus saying it aloud to one's self. A considerable body of theory and research exists to support the idea there are important differences between forms of self-directed language (e.g., Hardy, 2006). Another possible explanation for the differences observed across elicitation format could be due to introduction of

relational factors during the structured interview. Although a structured interview was used to increase consistency across subjects, it is possible that the interactions between the interviewers and participants may have varied on common factors (e.g., empathy). Given the positive results of this feasibility test, future studies could be designed to further control and/or assess for relational factors.

The current study also demonstrates the potential for examining self-directed language embedded within the decision-making process. A context-based proximal measure of decision-making, BW, was negatively associated with PHT and was a significant mediator of the relationship between PHT and subsequent alcohol use. These results are consistent with dual-process theories of decision-making, such that more deliberative decision-making factors (in the current study, conceptualized as the client language) influence proximal factors (here, conceptualized as willingness to accept alcohol offers from peers), which in turn influence actual behavior. These intriguing findings suggest a need for a broader theory of self-directed language as a component of the decision-making/change process and point to the potential for conditional models of self-directed language to expand our understanding of decision-making processes. Although preliminary in nature, the current findings could provide a framework to understand the intermediary mechanisms by which self-directed language influences future behavior.

Language is thought to be a MOBC in all psychotherapy (Miller & Rollnick, 2004) and while differential evocation of specific types of self-directed language is an aspect of the technical hypothesis of MI (Miller & Rose, 2009), it is not unique to MI. While promising, our findings must be considered within certain limitations, and any implications for clinical practice should be drawn with extreme caution. First, while the definitions of client language variables in the current study overlap considerably with traditional measures of CT and ST, it is plausible the current measures represent parallel constructs rather than capturing the same aspects of client language given the non-treatment context. Second, Miller and Rose (2009) identify two primary domains of hypothesized mechanisms of MI: a technical component and a relational component. The technical component of MI refers to the use of specific techniques to differentially strengthen CT while softening ST. The relational component of MI refers to elements of the interaction between clinician and client, such as empathy, acceptance, and positive regard. While we were able to isolate the technical hypothesis through systematic application of standardized situations, self-directed language elicited in therapy does not occur without the relational component of MI in the psychotherapeutic setting. A recent simultaneous test of the relational and technical components in mandated college students did not find significant relationships between self-directed language and alcohol use, but client measures of the relational component (i.e. self-exploration) were associated with outcome (Borsari et al., 2015); suggesting the interplay between relational and technical aspects of behavior change is important.

Additional limitations include the fact that the current sample consisted largely of White, 18–20 year olds starting their first year of college at 4-year institutions and may not generalize to all college students or other populations. Although a critical test of feasibility, this study was observational in nature and lacks an experimental component critical for more rigorous tests of self-directed language as a MOBC. Finally, although self-directed language and BW can be temporally ordered theoretically and a competing model with BW as the predictor and PHT as the mediator was not supported, these constructs were assessed concurrently in the present study. Future research may benefit from examining self-directed language and BW at different time points in the decision-making process.

Better understanding the role of self-motivational statements can have important implications for the application and training of MI, as well as behavioral treatment more broadly. The current study represents an exciting opportunity to expand and advance the empirical understanding of self-directed language as a MOBC. This study replicated the reliability and preliminary validity of laboratory techniques to elicit and measure dimensions of self-directed language through a longitudinal design and points to the viability of this strategy for controlling extraneous variables for future experimental tests. Greater rigor in the study of self-directed language can inform the general process of health behavior change. Novel laboratory paradigms for eliciting health-related language hold promise for establishing greater experimental control and scientific understanding of client language as a MOBC.

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