A review of decisional balance research and directions for brief alcohol intervention among college students

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Abstract
Introduction
Although existing alcohol interventions for college drinking are widely available, many undergraduates do not perceive any need to change their drinking. Intervention strategies that encourage students to consciously consider reasons for changing problem behaviours and resolve ambivalence may provide unique benefit. The decisional balance and alcohol literature suggest (1) a relationship exists between decisional balance and motivation to change; (2) the decisional balance proportion represents a promising new way to conceptualize motivation to change and (3) while the decisional balance proportion is a step forward in decisional balance measurement, it can be improved. This paper provides a review of decisional balance and proposes strategies for improving decisional balance measurement with respect to alcohol interventions for college students.

Conclusion
Alternative strategies proposed for improving the decisional balance proportion include (1) a weighted decisional balance proportion, which may increase predictive ability and provide a closer approximation of an individual’s motivation to change compared to the original decisional balance proportion; (2) a coded decisional balance proportion, which may allow for identification of common reasons as to why college students choose to drink or not drink and (3) personalised decisional balance proportion feedback, which may increase intervention efficacy by further highlighting the discrepancy between behaviours and goals. These strategies can be applied separately or in conjunction, and represent a potentially promising new avenue for decisional balance research.

Introduction
The evaluation of predictors of drinking outcomes includes attempts to identify malleable variables as targets for intervention. Strategies for assessing and manipulating motivational factors, such as the decisional balance (DB) procedure, have long been applied. However, to our knowledge, no one has yet conducted a review of alcohol-related DB studies. As such, there is a clear need to examine studies specific to alcohol treatment that incorporate a DB procedure, a method for representing benefits and costs of different choices to facilitate decision making.

College drinking
Problematic drinking among undergraduates remains prevalent1 with estimates indicating that 80% of undergraduates drink, 67% drink at least monthly and 40% frequently consume several drinks on an occasion2. Furthermore, undergraduate drinkers experience consequences ranging in severity including poor class attendance, trouble with authorities, hangovers, injuries3,4, depression5,6, eating disorders7, risky sexual behaviour and sexual assault8,9. Morbidity and mortality trends indicate that almost 20% of undergraduates meet DSM-IV criteria for alcohol dependence or abuse10, yet less than 5% seek treatment or counselling.

Existing alcohol interventions for college drinking are widely available, however, many undergraduates do not perceive any need to change their drinking11,12. Innovative intervention strategies that encourage students to consciously consider reasons for changing their drinking may provide unique benefits13.

Motivation and theoretical background
Motivation to change (MTC), a state of readiness to change, is a dynamic multi-dimensional state, and as it can be influenced by both internal and external conditions, it is a significant factor to consider in alcohol intervention14,15. MTC has been conceptualised as an increasingly thoughtful process wherein individuals more fully consider reasons for change14,15. MTC stems mainly from the trans-theoretical model (TTM)16 which proposes five stages of change: pre-contemplation, contemplation, preparation, action and maintenance16-19. Each successive stage indicates...
increased MTC and represents temporal dimensions\textsuperscript{17}. The TTM also proposes processes of change, which are potent predictors of change and are described as experiences or activities that an individual may engage in when attempting to modify their drinking. The TTM suggests successful change can be facilitated by doing the right things (processes) at the right time (stages), and this emphasises the importance of considering stages and processes when tailoring alcohol interventions\textsuperscript{20,18,19}.

One of the ways the TTM and theoretically-related constructs have been applied is via the brief intervention\textsuperscript{20–24}. Brief alcohol interventions have applied techniques including motivational interviewing (MI)\textsuperscript{25}. The goal of MI is to resolve ambivalence, a phenomenon characterised by the experience of coexisting discordant cognitions. MI highlights discrepancies between an individual’s behaviours and goals\textsuperscript{15,25} by eliciting self-motivational statements, which reflect cognitive and behavioural dimensions of commitment to change. The DB procedure is one method for eliciting self-motivational statements and resolving ambivalence.

**DB**

DB, which dates back to Irving Janis and Leon Mann\textsuperscript{26}, is a method for representing the benefits and costs of different choices and has been used to facilitate decision making. In order to be motivated to reduce drinking, the costs of drinking must outweigh its benefits and the pros of reducing drinking must outweigh its cons. Data generated during a DB may serve as a proxy for readiness to reduce drinking\textsuperscript{26}. Research supports the perspective that DB is a marker for the initiation of specific stages of change\textsuperscript{27}, and stages of change can be operationalised as a function of changes in DB\textsuperscript{20,29}. Thus, DB demonstrates potential to reflect and enhance motivational states, and can be used as an assessment tool as well as an intervention procedure.

**Discussion**

The authors have referenced some of their own studies in this review. These referenced studies have been conducted in accordance with the Declaration of Helsinki (1964) and the protocols of these studies have been approved by the relevant ethics committees related to the institution in which they were performed. All human subjects, in these referenced studies, gave informed consent to participate in these studies.

**DB in alcohol studies**

To find publications, we searched the Medline and PsychINFO databases using the keywords decisional balance and alcohol in the “all text” field. Then, publications were searched manually for additional references. In order to be included in the present review, the papers had to (a) contain a DB component either as part of a multi-component program/intervention or as a stand-alone intervention and (b) target drinking behaviours. We identified 23 studies that incorporated a DB component in alcohol intervention that matched our inclusion criteria (Table 1).

Enhancing awareness that an alcohol problem exists is important in initiating movement towards deciding to reduce drinking\textsuperscript{15,25}. Table 1 presents evidence and characteristics of alcohol-related studies using DB. Alcohol-related DB can be used to overcome denial and enhance alcohol problem recognition\textsuperscript{45,50}. Studies show alcohol-related DB is significantly related to Motivation to change (MTC) (e.g. stages of change) in varying populations such as at-risk college drinkers\textsuperscript{12,11,26}, heavy drinking non-college individuals\textsuperscript{45}, middle school students\textsuperscript{39}, women at risk for HIV\textsuperscript{35–38,46,49}, cross-cultural populations\textsuperscript{2} and clinical populations\textsuperscript{41}.

Alcohol-related interventions incorporating a DB component are generally associated with favourable outcomes including decreased drinking or increased MTC\textsuperscript{35,36,46,49}. Research shows DB may have increased predictive ability with respect to drinking compared to alcohol expectancies\textsuperscript{42}. Furthermore, an examination of the relationship between stage of change and DB among a treatment-seeking group of women showed that consistent with Janis and Mann’s\textsuperscript{26} theory of decision making, salience of pros and cons of change was associated with deciding to take action\textsuperscript{45}.

In many of these studies, DB measures have included the Alcohol Decisional Balance Scale\textsuperscript{51}, the Alcohol and Drug Consequences Questionnaire\textsuperscript{33} and the Decisional Balance for Immoderate Drinking\textsuperscript{46}. As noted by Collins and colleagues\textsuperscript{13}, one of the weaknesses of these measures is the focus on pros and cons of current drinking or of reducing drinking, which is not a comprehensive DB. An incomplete DB focuses on only half of the decision-making processes (e.g. either the pros and cons of current behaviour or the pros and cons of an alternative behaviour). Additionally, items of the measures are researcher-rather than participant-generated, and this may not capture authentic MTC drinking\textsuperscript{45}. Thus, an open-ended comprehensive response format is preferred, during which individuals can work through ambivalence and progress along stages of change\textsuperscript{16,18,19,22}.

One of the methodological limitations of existing brief interventions involves multiple components. When DB has been applied in alcohol intervention, it has generally been in multi-component programs, which prohibits the evaluation of DB as a unique contributor. Few studies have evaluated DB as a stand-alone alcohol intervention, and they have
revealed mixed findings. LaBrie and colleagues\textsuperscript{36,37} evaluated DB in a sample of high-risk male undergraduates and found that it led to decreases in drinking and intent to drink, findings that support the use of DB as a stand-alone intervention.

In contrast, two studies did not find support for a stand-alone DB intervention\textsuperscript{21,22}. Collins and Carey\textsuperscript{22} compared in-person and

<table>
<thead>
<tr>
<th>Citation</th>
<th>Sample size</th>
<th>Sample description</th>
<th>Study</th>
<th>DB measure type</th>
<th>Findings</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Babbin\textsuperscript{10}</td>
<td>3565</td>
<td>Sixth grade students from 20 schools</td>
<td>Data were from baseline of an intervention</td>
<td>Decisional Balance Inventory for the prevention of alcohol use (&quot;pros/cons&quot; but really pros of drinking and pros of not drinking)</td>
<td>The DBIPA demonstrates high factorial invariance</td>
<td>Homogeneous racial sample</td>
</tr>
<tr>
<td>Carey\textsuperscript{31}</td>
<td>677</td>
<td>College students (mandated)</td>
<td>Data were from baseline of an intervention</td>
<td>Decisional balance for immoderate drinking (pros/cons of current drinking)</td>
<td>Gender differences emerged on motivational variables. Family history was related to drinking pattern and DB</td>
<td>Mandated sample restricts generalisability</td>
</tr>
<tr>
<td>Carey\textsuperscript{21}</td>
<td>509</td>
<td>College students (heavy drinkers)</td>
<td>RCT, six conditions, assessments at 1, 6 and 12 months</td>
<td>Four-field open-ended worksheet</td>
<td>TLFB interview reduced drinking at 1 month, basic BMI improved drinking outcomes beyond TLFB at 1 month, enhanced BMI did not</td>
<td>Retrospective self-reports (recall bias), homogeneous sample (lack of diversity)</td>
</tr>
<tr>
<td>Collins\textsuperscript{22}</td>
<td>131</td>
<td>College students (heavy drinkers)</td>
<td>RCT, three conditions, assessments at baseline, 2 weeks and 6 months</td>
<td>Four-field open-ended worksheet (in-person or written DB)</td>
<td>In-person DB generated more cons of current drinking than written DB, but no support for DB as a stand-alone intervention</td>
<td>Generalisability Sample characteristics may have limited sensitivity of design</td>
</tr>
<tr>
<td>Collins\textsuperscript{13}</td>
<td>143</td>
<td>College students (heavy drinkers)</td>
<td>Intervention, assessments at baseline, 1, 6 and 12 months</td>
<td>Four-field open-ended worksheet, calculated DBP</td>
<td>DBP predicted changes in drinking up to 6 months, supporting DB as stand-alone intervention</td>
<td>Non-random sample Generalisability (homogeneous racial and ethnic sample)</td>
</tr>
<tr>
<td>Collins\textsuperscript{32}</td>
<td>191</td>
<td>Treatment seeking smokers</td>
<td>Secondary analysis of data from a smoking cessation intervention (two conditions)</td>
<td>Four-field open-ended worksheet, calculated DBP</td>
<td>DBP change scores predicted smoking frequency and relapse, supporting use of DB as stand-alone intervention</td>
<td>Non-random sample</td>
</tr>
<tr>
<td>Cunningham-ham\textsuperscript{13}</td>
<td>218</td>
<td>Clients in an outpatient treatment facility</td>
<td>Single assessment</td>
<td>Alcohol and Drug Consequences Questionnaire (pros/cons of changing alcohol/drug use)</td>
<td>Scale development. Measure appears to be a useful indicator of DB</td>
<td>Generalisability to non-clinical population</td>
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Table 1 Continued

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Grothues</td>
<td>408</td>
<td>Clinical patients meeting alcohol abuse criteria</td>
<td>Cross-sectional</td>
<td>Alcohol Decisional Balance Scale (adapted and translated to German)</td>
<td>Comorbidity was related to higher use of processes of change and more pros and cons of drinking compared to non-comorbid individuals</td>
<td>Procedure bias (some in-person, some via mail to save time) Generalisability to non-clinical population</td>
</tr>
<tr>
<td>Johnson</td>
<td>1240</td>
<td>Students in USA, England and Israel</td>
<td>Cluster analyses on four independent samples</td>
<td>Decisional Balance Inventory (DB for not using substances for elementary and middle schools, and pros/cons for using for high school samples)</td>
<td>Four prevention profiles emerged (most protected, least positive, most tempted and most negative)</td>
<td>Age generalisability Cross-sectional data prohibits causational inferences</td>
</tr>
<tr>
<td>LaBrie</td>
<td>230</td>
<td>College students (sanctioned males)</td>
<td>Intervention, assessments at baseline and weekly for 3 months</td>
<td>Facilitator-led DB (*weighted DB for items that most resonated with participants)</td>
<td>Intervention reduced drinking</td>
<td>Generalisability, lack of RCT (no true control group)</td>
</tr>
<tr>
<td>LaBrie</td>
<td>167</td>
<td>College students (adjudicated)</td>
<td>Single session MI-style group intervention</td>
<td>Group dialogue DB</td>
<td>Significant reductions in drinking, significantly moreso in males</td>
<td>No control group</td>
</tr>
<tr>
<td>LaBrie</td>
<td>47</td>
<td>College males</td>
<td>Intervention, assessments at baseline and 1 month</td>
<td>Facilitator-led DB</td>
<td>Decreased intention to drink, drinking levels and increased MTC at 1 month follow-up. DB as a unique intervention is supported.</td>
<td>Women excluded</td>
</tr>
<tr>
<td>LaBrie</td>
<td>115</td>
<td>Adjudicated college females</td>
<td>Group intervention, 3-month follow-up</td>
<td>Group dialogue DB</td>
<td>Significant reductions in drinking and related consequences across 3-month follow-up</td>
<td>Multi-component intervention (can’t evaluate DB as stand-alone intervention)</td>
</tr>
<tr>
<td>Migneault</td>
<td>853</td>
<td>Tenth and eleventh graders attending vocational training</td>
<td>Single assessment</td>
<td>Decisional Balance Inventory</td>
<td>Scale development (immoderate drinking)</td>
<td>Generalisability</td>
</tr>
<tr>
<td>Migneault</td>
<td>629</td>
<td>College students</td>
<td>Single assessment</td>
<td>Decisional Balance Questionnaire</td>
<td>Scale development (immoderate drinking)</td>
<td>Generalisability</td>
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</tbody>
</table>

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<tr>
<td>Morgen41</td>
<td>462</td>
<td>College students</td>
<td>Single assessment</td>
<td>Alcohol Decisional Balance Scale (pros/cons of alcohol use)</td>
<td>Students meeting alcohol disorder criteria perceived their drinking as normal and reported highest pros. Pros were linked with problem drinking</td>
<td>External validity, sampling error</td>
</tr>
<tr>
<td>Noar42</td>
<td>406</td>
<td>College students</td>
<td>Single assessment</td>
<td>Alcohol Decisional Balance Scale (pros/cons of alcohol use)</td>
<td>DB has equal or better predictive validity to expectancies. Positive expectancies and pros were positively related to each other and both predicted drinking, but DB was just as good a predictor and sometimes better than expectancies</td>
<td>Did not measure subjective evaluations</td>
</tr>
<tr>
<td>Nye43</td>
<td>72</td>
<td>College students (heavy drinkers)</td>
<td>Experimental 2 × 2 design, assessments at screening and 3 months</td>
<td>Modified Decisional Balance Measure (with bar mounted on horizontal axis, DB based on acute/obtuse angles)</td>
<td>Intervention conditions increased cons of drinking</td>
<td>Posttest-only design</td>
</tr>
<tr>
<td>Semaan44</td>
<td>1938</td>
<td>Sexually-active women</td>
<td>Data were from baseline of an intervention</td>
<td>Decisional Balance Measure (standardised)</td>
<td>Identified characteristics of women with low pros and high cons. Binge drinking associated with decreased pros. Income associated with increased DB scores. Most women had negative DB scores regarding condom use</td>
<td>Cross-sectional data prohibits causalional inferences</td>
</tr>
<tr>
<td>Share45</td>
<td>119</td>
<td>Alcohol-dependent, treatment-seeking women</td>
<td>Single session prior to treatment</td>
<td>Alcohol and Drug Consequences Questionnaire (pros/cons of drinking)</td>
<td>Salience of pros and cons of changing behaviour was associated with a decision to take action. DB is linked with MTC</td>
<td>Cross-sectional data prohibits causalional inferences</td>
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</tbody>
</table>

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Table 1 Continued

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</tr>
</thead>
<tbody>
<tr>
<td>Talpade46</td>
<td>407</td>
<td>Adolescent students</td>
<td>Data were from a curriculum-based program</td>
<td>Four-field open-ended worksheet, calculated DBP</td>
<td>The majority of the participants (94%) made significantly more healthy decisions</td>
<td>No control group</td>
</tr>
<tr>
<td>Thyrian47</td>
<td>137</td>
<td>Alcohol and tobacco users in Germany</td>
<td>Single assessment</td>
<td>Decisional Balance Measure</td>
<td>Little correspondence between stages of change for alcohol versus smoking</td>
<td>Generalisability</td>
</tr>
<tr>
<td>Velasquez48</td>
<td>132</td>
<td>Alcohol-dependent outpatients in a public mental health clinic</td>
<td>Data were collected prior to treatment</td>
<td>Alcohol Decisional Balance Scale (pros/cons of drinking)</td>
<td>DB considerations were related to psychiatric severity</td>
<td>Generalisability to non-clinical population</td>
</tr>
<tr>
<td>Walton49</td>
<td>3338</td>
<td>Adolescent patients seeking treatment at an emergency department</td>
<td>Three conditions, assessments at baseline, 3 months and 6 months</td>
<td>DB exercises via computer or therapist (multi-component), DB for potential benefit of staying away from drinking/fighting</td>
<td>Participants in the intervention conditions showed reduced aggression compared to controls at 3- and 6-month follow-ups</td>
<td>Generalisability</td>
</tr>
</tbody>
</table>

written DB among heavy drinking undergraduates and findings revealed no drinking differences among the two DB groups and control. In a separate study, Carey and colleagues31 examined brief MI with and without a DB component, and although no condition evaluated DB as a stand-alone intervention, findings suggested that addition of a DB component did not improve outcomes. Thus, although multi-component alcohol interventions incorporating DB have demonstrated favourable outcomes, studies assessing DB’s unique effect show mixed findings.

A new DB measure was recently proposed13, and it evaluates the ratio of items by converting pros and cons into a DB proportion (DBP). Drinking outcomes were consistently predicted by DBP in an alcohol intervention13 and these findings were replicated for smoking outcomes in a tobacco intervention12. Thus, the DBP seems to represent a step forward in DB measurement.

Inferences and strategies for improving DB
First, it is clear that a relationship exists between DB and MTC. That is, DB is associated with stage of change and can serve as a proxy for MTC. Second, the DBP represents a new and promising way to conceptualise MTC13,32; showing promise as a stand-alone alcohol intervention13,32. Third, DBP might be improved using strategies including (1) a weighted DBP; (2) coding the DBP and (3) personalised DBP feedback (Figure 1).

Participant-weighted DBP
The DBP implicitly assumes all pros and cons are equally weighted as it is calculated based on a simple count of the number of pros and cons for changing and the number of pros and cons for not changing. However, it seems reasonable to assume that some motivations may carry greater weight than others. Furthermore, what is highly valued by some individuals may not be of any importance to others. Incorporating weights into the DBP seems like an important and innovative advance for alcohol interventions to consider. The weight (i.e. importance) of pros and cons may provide significant information. Researchers might consider evaluating differences between the originally proposed, non-weighted alcohol-related DBP13 and a weighted alcohol-related DBP. Participants in the weighted condition may be asked to complete the open-ended, four-field DB sheet...
and assign weights of importance to each pro and con ranging from 1 (not at all important) to 7 (extremely important). Each item’s weight can be incorporated into its score using this modified DBP formula:

\[
\left( \frac{\text{pro} \times W_{\text{pro}} + \text{cons} \times W_{\text{cons}}}{\text{pro} + \text{cons}} \right)
\]

This formula differs slightly from the original DBP formula in that it incorporates “W” which refers to the weights for that particular field (see Figure 2 for an example of a weighted DBP). As a weighted DBP likely provides a closer approximation of an individual’s MTC compared to a non-weighted DBP, it is logical to assume that the weighted DBP will extend the strengths of the original DBP and be a better predictor of both proximal and distal drinking. Moreover, it is possible that specific items will carry differential weight to an individual over time. A weighted DBP would not only be able to distinguish changes in the pro–con proportion, it would also help extricate changes in the relative importance of specific items. Potential strengths of a weighted DBP include increased predictive ability for drinking behaviour, and thus, may represent a significant leap forward in DB measurement.

Coding participant-generated DBP

The original DBP, calculated via a simple count, uses uncoded pros and cons, however, it is likely that the actual content of the responses holds significant information. In the context of a college alcohol intervention, categorising reasons for and against drinking might help researchers understand common reasons why undergraduates choose to drink or not to drink. In particular, qualitative analyses via the coding of responses from heavy drinkers will facilitate the tailoring of interventions to make salient the reasons for drinking less in this high-risk population.

Previous research has examined drinking motives via researcher-generated scales such as the drinking motives questionnaire\(^52\) to determine frequency of drinking for social, enhancement, coping and conformity motives\(^53\). However, there is a lack of published research focusing on participant-generated reasons for drinking, and thus, coding the DBP seems like an innovative and important advance in alcohol intervention. Additionally, if the coded DBP is used in conjunction with the weighted DBP, researchers would be able to identify whether certain common reasons for or against drinking on average carry greater weight than other common reasons. Furthermore, longitudinal evaluation may help clarify whether changes in the weight of common reasons are more strongly associated with decreased drinking compared to changes in the weight of other reasons. Thus, a coded DBP has potential utility and may be a useful advance in DB measurement.

Figure 1: Weighted DBP, coded DBP and personalised DBP feedback.

Figure 2: Non-weighted versus weighted DBP.
Personalised DBP feedback

The third strategy for improving DBP relates to personalised feedback. Personalised feedback has been shown to reduce drinking, whether it is delivered via mail, interview or computer (for reviews, see23,54). In the context of an alcohol brief intervention, personalised DBP feedback might consist of (1) self-reported drinking; (2) weighted or non-weighted DBP (e.g. “Your responses indicate you are motivated to drink less”) and (3) common reasons for choosing not to drink, derived from the coded DBP (e.g. “Many undergrads say academic performance and saving money are important factors in choosing not to drink”).

It is important to note that just completing the balance worksheet (without feedback) highlights the discrepancy between behaviours and goals13. However, it is possible that personalised DBP feedback would further enhance the experience of dissonance. Moreover, if relevant reasons for reducing drinking are presented (derived from a coded DBP), feedback is likely to encourage greater reductions in drinking compared to completing the worksheet alone.

Conclusion

This paper provided a review of DB research and proposed strategies for improving DB with respect to alcohol brief interventions for undergraduates. DBP’s predictive validity may be improved via application of strategies including (1) a weighted DBP; (2) a coded DBP and (3) personalised DBP feedback. Strategies encouraging students to consciously consider reasons for changing drinking may provide unique benefit.

References


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Review


