Red box, green box: A self-report behavioral frequency measurement approach for behavioral addictions research

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VIEWPOINT

ABSTRACT

Behavior frequency measures in behavioral addictions research fail to account for how engagement in the activity relates to each respondent's personal circumstances. We propose a "Red Box, Green Box" method, an alternative to conventional self-report behavior questions. Participants report two distinct time-based values: (1) *Green box*: time spent engaged in the activity during 'free' time, and (2) *Red box: engagement in the activity at times when the respondent should be doing something else* (e.g., studying, working, sleeping, exercising, etc.). Some practical examples of the 'red box, green box' method are provided. This method may help to calibrate behavioral frequency for each respondent and yield clearer insights into displacement effects and risks associated with frequency of use. We suggest some future research directions to test the feasibility and utility of this approach in different implementations.

A significant challenge in the behavioral addictions field is assessment of behavior using self-report surveys (King, Billieux, Carragher, & Delfabbro, 2020; King et al., 2024). Part of the difficulty lies in the complexity of the behavior. Individuals who routinely play video games, for example, may engage in multiple, unpredictably brief and/or extended gaming sessions per day, and these sessions may occur in conjunction with other online adjacent activities (e.g., online chat, social media, browsing online forums, and streaming). Self-reported behavior, as expressed in minutes or hours, may therefore tend to be more meaningful in relative terms, rather than as an absolute value.

A conventional approach to measuring digital media use involves asking participants to estimate total use within a particular time period. A standard question may give parameters such as a 'typical weekday' or a 'typical weekend day' and a guiding timeframe such as the past 3 months. It is generally assumed that greater behavioral frequency increases risk of harmful or problematic use. However, a single frequency value (e.g., hours per week) seems unlikely to account for each respondent's personal circumstances, including whether the activity is in balance with other activities or has become excessive (King & Delfabbro, 2018). This problem is clear from studies of video game play and gaming disorder (NB: it can also be observed in studies of social media use and mobile phone use), wherein the correlation between a symptom checklist and self-report data tends to fall between 0.25 and 0.50 (King, Billieux et al., 2020; King, Chamberlain et al., 2020; Király, Tóth, Urbán, Demetrovics, & Maraz, 2017). Similarly, objective behavioral tracking research suggests that intensive involvement in video games is not in itself problematic (e.g., Larrieu, Fombouchet, Billieux, & Decamps, 2023). Recognising this,

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some clinical studies have applied very high frequency thresholds (e.g., 4 h per day or 30 h per week; Han, Hwang, & Renshaw, 2010) on the assumption that this level of engagement would be harmful to most people regardless of circumstances.

Here we propose the "Red Box, Green Box" method, a simple alternative to conventional self-report behavior frequency questions. To our knowledge, this method has not been previously employed in survey studies. To provide a basic summary of the approach, this method involves asking participants to report two time-based values (within any given timeframe). First, in a green box, the participant is instructed to estimate the total amount of time spent engaged in the activity during available 'free' time (i.e., when they have no other commitments, or when passing the time, such as during a commute on public transport). Second, in a red box, the participant is asked to report the amount of time spent engaged in the activity when they "should be doing something else" (e.g., studying, working, sleeping, exercising, etc.). In this way, the red box value should represent the degree to which the activity occurs in conflict with personal motives and/or other important activities and obligations. The red and green box values may be summed to obtain a total engagement value. Alternatively, participants could first provide their total use estimate and then indicate a red-green ratio or weighting. An alternative approach to asking for 'total weekly time' is to ask for 'typical weekday' or a 'typical weekend day', which may be simpler for participants to report.

Here we will provide a more detailed explanation of the 'red box, green box' method – using the example of gaming behavior: first, a survey could ask, "Next, we would like to understand your involvement in gaming activities, that is, how much time you spend gaming and how gaming fits in with other activities in your life. First, can you please estimate the total time, in hours, that you spend engaged in gaming in a typical week? Please consider your gaming in the last 3 months. [A box or lined space is provided for the respondent to record the number]." Note that this first question has been the conventional survey approach that is used in research and its inclusion is intended to provide a point of comparison to the subsequent red and green box responses (i.e., the red and green box values should, in theory, sum to the total of this first box). A question on total hours may not be strictly necessary but may be useful as a validity check.

Following this, the survey would then ask: "Now, we are interested in understanding how your gaming time fits in with other activities in your life. For this part, we want to be more specific and divide your gaming time into 'Red' and 'Green' time. Let us start with 'GREEN' time. Can you please estimate the total time (in hours) in a typical WEEK that you spend engaged in gaming during your free time or 'hobby time' (i.e., at times for recreation in between your important commitments), or when just passing the time (e.g., when riding the bus)? Again, please consider your gaming in the last 3 months. [A green box or lined space is provided for the respondent to record the number]. Now, let us

consider the 'RED' time. Can you please estimate the total time (in hours) in a typical WEEK that you spend engaged in gaming at times when you feel that you should be doing something else? This includes gaming when you have other commitments, priorities, or other goals or intentions for the day (e.g., studying, working, sleeping, exercising, etc.). Please consider your gaming in the last 3 months. [A red box or lined space is provided for the respondent to record the number]." Figure 1 provides a visual summary of this approach, for ease of sharing/dissemination. We note, again, that a 'typical weekday' or a 'typical weekend day' format, or other questions, could be applied to this response format.

The above questions are intended as a guide rather than being strictly prescriptive. Figure 2 provides some additional examples of the 'red box, green box' method. Alternative #1 provides both boxes together to minimise order effects and to reduce administration time (i.e., 1 question vs 2 questions). Alternative #2 provides a sliding ruler response for participants to indicate the relative proportion of green and red time (NB: this design was created with an online survey format in mind; the default setting would be a 50:50 ratio
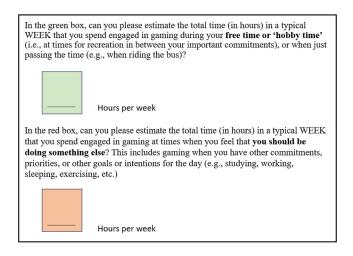

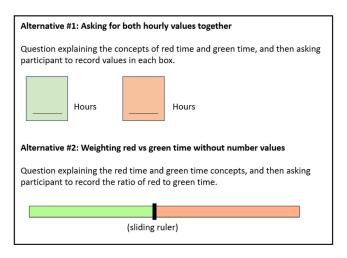*Fig. 1.* A visual representation of the 'red box, green box' method'

Fig. 2. Alternative implementations of the 'red box, green box' method

and require participants to interact with the slider). This slider approach would be complemented by an additional question asking for total time spent engaged in the activity, to further quantify the weighting. It should be noted that the reference to colours (i.e., 'green' time) and the use of coloured boxes or spaces may not be necessary, as alternative wordings may be appropriate. Our view is that these colours are advantageous as a helpful visual reference, perhaps with 'positive' (desirable) and 'negative' (unwanted) connotations recognizable to younger populations; however, other stylings, visual aids, and references may be similarly helpful.

There are several ways that future studies could evaluate the content and delivery of these questions, to determine whether different presentations may affect responses, and examine how responses relate to measures of problem behavior (e.g., gaming disorder symptoms). First, researchers could evaluate: whether the initial question on 'total time' tends to align with the sum of the red and green box times; whether there are differences in 'red time' values when an additional question is framed from a significant other's perspective (e.g., when a parent believes the respondent should be doing 'something else'); whether the ordering of questions on red and green time affects responses to either question (i.e., do participants tend to attribute more time to the box presented first?); whether red box time is more strongly related to problem scores than total time and, similarly, whether statistically high green time values are necessarily beneficial (e.g., in relation to mental wellbeing), and; whether the 'red box, green box' method may benefit from refinements, such as a third box (e.g., an orange box) that represents the respondent's uncertainty about the circumstances of their behavior (i.e., an 'unsure' category).

An important issue that arises in discussion of survey-based study limitations is how each participant's level of insight affects their capacity to report their behavior. We acknowledge that the 'red box, green box' method may not yield data that is more objective (i.e., accurate) than the conventional approach of measuring total time involvement in an activity. However, the additional questioning (or the more detailed framing of the question) associated with the proposed method may potentially assist participants to recognise the types of behaviors of interest to a researcher or research team. At the same time, asking participants to report the frequency of behavior in different ways may not necessarily improve their insight or reduce human biases such as demand characteristics, social desirability bias, or denial. In this respect, a potential advantage of the 'red box, green box' method is its capacity to identify discrepancies more clearly. For example, a problem gamer who meets all of the gaming disorder criteria who reports a red box time of zero hours (or a similarly negligible value) may indicate potential withholding or misrepresenting information. Such participants would not be so easily identified if they had reported 40+ hours, for example, on a standard 'total time' measure.

The 'red box, green box' method is a simple alternative to existing approaches that may prove useful for calibrating

frequency estimates to emphasise risk and life interference, but we note that it would not necessarily stand alone as a measure of harm or dysfunction (Delfabbro, Georgiou, & King, 2020). In gaming studies, this method may help to distinguish so-called 'highly involved' and 'problem' gamers (Billieux et al., 2017, Billieux, Flayelle, Rumpf, & Stein, 2019). Practically, this approach should not be any more difficult or time-consuming than existing approaches. Although the focus of this paper has been on behavioral addictions research, with gaming behavior and gaming disorder as a major point of interest, the 'red box, green box' method may be relevant and useful to broader media effects research. We suggest researchers consider adopting and critically evaluating this method, or some variation of the basic concept, in studies that examine the relationship between addictive behaviors of interest and activities of daily living, hobbies, and various life responsibilities and commitments.

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