



Review article

Lucid dreaming incidence: A quality effects meta-analysis of 50 years of research



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ABSTRACT

We report a quality effects meta-analysis on studies from the period 1966–2016 measuring either (a) lucid dreaming prevalence (one or more lucid dreams in a lifetime); (b) frequent lucid dreaming (one or more lucid dreams in a month) or both. A quality effects meta-analysis allows for the minimisation of the influence of study methodological quality on overall model estimates. Following sensitivity analysis, a heterogeneous lucid dreaming prevalence data set of 34 studies yielded a mean estimate of 55%, 95% C. I. [49%, 62%] for which moderator analysis showed no systematic bias for suspected sources of variability. A heterogeneous lucid dreaming frequency data set of 25 studies yielded a mean estimate of 23%, 95% C. I. [20%, 25%], moderator analysis revealed no suspected sources of variability. These findings are consistent with earlier estimates of lucid dreaming prevalence and frequent lucid dreaming in the population but are based on more robust evidence.

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1. Introduction

Dreams in which the dreamer becomes aware they are dreaming are known as 'lucid dreams' (LaBerge & Rheingold, 1990). Hearne (1978) and LaBerge (1980) demonstrated that lucid dreams represent an objectively verifiable altered-state of consciousness when showing participants could signal their lucid state during dream periods using pre-agreed eye-movement signals. While this shows that certain people under certain conditions can achieve awareness during dream states, it tells us little about their occurrence *in situ* among the general public. Knowledge of this is important; if it can be established that lucid dreaming is a common experience for individuals then this may act as an impetus for increased research investigating the causes of its occurrence and stimulate a greater consideration of the ways in which the experience of lucid dreaming may be utilised as a practical tool.

The most recent review of estimates of lucid dreaming incidence (Snyder & Gackenbach, 1988) distinguishes between lucid dreaming *prevalence* (the number of individuals experiencing at least one lucid dream) and *frequent* lucid dreamers (those reporting one or more lucid dreams per month). In summarising survey data, Snyder and Gackenbach report "conservative" estimates for lucid dreaming prevalence of 58% of the population with a further 21% of individuals as frequent lucid dreamers. Unfortunately it is not clear how these estimates were calculated, since the method of analysis is not described—a weighted mean would be the most likely estimation technique—and we assume that a study reporting 100% prevalence was omitted from their calculation. Weighted means for two studies (Gackenbach et al., 1987 cited in Snyder & Gackenbach, 1988; LaBerge, 1985) could not be calculated by us as sample sizes were not reported. In an attempt to verify their findings weighted means were calculated with these studies omitted, which produced rates of 62% for prevalence and 19% for frequency. Snyder and Gackenbach (1988) do not report confidence intervals for their estimates, which cannot be calculated via secondary analysis without information of the total sample size (Cumming, 2011). Of concern is the high variation amongst effect size estimates in Snyder and Gackenbach's review, which the authors attribute to methodological inconsistencies between studies and differences in sample characteristics, though they do not subject this speculation to any empirical test. Since their paper was published statistical methods have been developed which enable a reduction in the impact of poor methodological features upon pooled effect size estimates. The primary aim of the current study is therefore to provide an updated meta-analytic review of studies reporting incidence data for the occurrence of lucid dreams, including additional analyses to identify sources of the variance in outcomes.

One of the potential sources of variability identified by Snyder and Gackenbach (1988) is an inconsistency in how lucid dreams are defined or exemplified when asking people about their experience of them; unclear definitions have been demonstrated to lead to participant error that can affect as much as a fifth of a sample (Gackenbach, 1988). Whereas Green and McCreery (1994) argue that lucidity is sufficiently defined as the dreamer being aware they are dreaming, Tart (1988) argues for the earlier conceptualisation of lucid dreams as presented by Van Eeden (1913) which requires that the dreamer has complete memory of their waking life and is able to exert control over aspects of the dream. This latter definition is problematic because Voss, Frenzel, Koppehele-Gossel, and Hobson (2012) found only 37% of lucid dreamers in their sample reported they could manipulate the dream. Mota-Rolim et al. (2013) also report only 25.2% of their sample claimed very frequent or consistent control within lucid dreams. Despite control being highlighted as a key element of lucidity alongside disassociation and insight (Voss & Hobson, 2015) these findings suggest that control is not in itself a qualifying criterion necessary to determine whether a lucid dream has been experienced. Tart and Van Eeden's definition with its emphasis on control may therefore be useful in differentiating between 'degrees' or 'depths' of lucidity, however using it as a definitive definition to the exclusion of dream experiences which lack control but retain other characteristics such as insight and disassociation may provide impoverished estimates of lucid dreaming incidence. Therefore in this paper the broader definition of lucid dreaming shall be adopted in an effort to provide the most valid estimates of lucid dreaming incidence.¹

Additionally, Snyder and Gackenbach (1988) report prevalence rates are reduced (i.e. false positives are avoided) in studies where an example dream narrative—a written verbatim account of a dream from the perspective of the dream experient—is given alongside the definition of lucidity. This approach has been more recently recommended as good practice (Schredl, Henley-Einion, & Blagrove, 2012) and has been adopted by a number of researchers (e.g., Erlacher, Schredl, Watanabe, Yamana, & Gantzert, 2008; Voss et al., 2012). Others have asked participants to produce an example narrative

¹ Here we focus on the simple definition of lucid dreaming for ease of participant understanding in incidence studies, proposing insight as the principle lucid dream defining criteria. However the authors wish to acknowledge this is a more complex debate (please see Kühle, 2015; Noreika, Windt, Leggenhager, & Karim, 2010; Windt & Metzinger, 2007).

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