
Article:
Conner, M.T. and Norman, P.D. orcid.org/0000-0002-5892-0470 (2017) Health behaviour: Current issues and challenges. Psychology and Health, 32 (8). pp. 895-906. ISSN 0887-0446

https://doi.org/10.1080/08870446.2017.1336240

Conner, M.T., & Norman, P. (2017).

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Psychology & Health, 32, 895-906.

http://dx.doi.org/10.1080/08870446.2017.1336240

Editorial:

Health Behaviour: Current Issues and Challenges

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The current issue of Psychology & Health focuses on an important topic for contemporary health psychology, namely health behaviours. Health behaviours have been defined as '. . . overt behavioral patterns, actions and habits that relate to health maintenance, to health restoration and to health improvement' (Gochman, 1997, p. 3). A variety of behaviours fall within such a definition including smoking, alcohol use, diet, physical activity, sexual behaviours, physician visits, medication adherence, screening and vaccination. We believe that the study of health behaviours in both healthy and unhealthy populations is an important area where health psychology can and has made important contributions to improving health.

Four widely studied health behaviours that are a regular focus of attention in Psychology & Health are smoking (e.g., de Graaf et al., in press), binge drinking (e.g., Lynch, Coley, Sims, Lombardi, & Mahalik, in press), healthy diet (e.g., Elbert, Dijkstra, & Rozema, in press), and physical activity (e.g., Sheeran, Cameron, & Bertenshaw, in press). The current issue brings together a set of state of the art reviews on each of these four health behaviours by experts in the field (smoking: West, 2017; binge drinking: Kuntsche et al., 2017; healthy diet: de Ridder et al., 2017; physical activity: Rhodes et al., 2017). Each review provides an overview of what we know about that health behaviour in relation to definitions, impacts on health, prevalence in different groups, key determinants, and effectiveness of interventions, as well as providing future directions for research. As we know from publications in journals such as the Annual Review of Psychology such state of the art reviews can be both useful sources of information and stimulate new research. We believe the current reviews are likely to be useful in both of these ways to a broad range of readers, from those with little knowledge of the area to those actively involved with research on these health behaviours.

In the remainder of this editorial we draw out some overarching issues in relation to work on health behaviours. Four issues relevant to the different health behaviours are highlighted: the complex interrelationship between the definition of health behaviours and their prevalence and impacts on health; the degree of commonality among key determinants; the effectiveness of interventions; and potential directions for future research.

Defining and Measuring Health Behaviours

Defining a behaviour is an essential component of the measurement process. Without clear definition we cannot have reliable and valid measurement. But even with clear definitions, reliable and valid measurement can still be difficult. As the four reviews highlight, the vast majority of research on health behaviours relies on self-report measures of behaviour. Such self-report measures may have questionable validity. As Rhodes et al. (2017) point out, the correlation between self-reported and objectively measured physical activity can be quite low for various understandable reasons. For example, definitions of physical activity vary along the dimensions of frequency, intensity, time or duration and type and objective measures likely capture different combinations of these dimensions than do self-report measures. Similar issues complicate the measurement of binge drinking (self-reports require estimates of the number, volume and strength of drinks consumed) and smoking (self-reports require estimates of number, intensity and types of tobacco products consumed and perhaps even how much smoke is drawn into the mouth and or lungs). For both of these behaviours there are objective measures available (usually based on breath or blood alcohol levels or on breath carbon monoxide or saliva cotinine). However, these objective measures may have their own limitations. For example, objective measures of blood alcohol levels only assess alcohol consumption over a limited (recent) timeframe. In relation to healthy diet, the difficulties are amplified due to the current lack of any simple objective measurement (de Ridder et al., 2017). Self-reported measurement of healthy diet is also problematic due to the complexity of the behaviour

(e.g., estimating the macronutrient content of consumed items to produce a measure of fat intake or the extent to which one complies with a set of recommendations in the Mediterranean diet).

A related issue in relation to the definition of health behaviours is the link to the health outcomes. The complexity here is in the link between the behaviour and the various different health outcomes. The evidence for the link between health behaviours and health outcomes is generally stronger for some behaviours (e.g., smoking, physical activity) than others (e.g., binge drinking, diet). However, for each health behaviour there is a complex set of relationships to different health outcomes (and one where the mechanisms are only partly understood; see Baum & Posluszny, 1999 for one simple classification). For example, as Rhodes et al. (2017) note, although increasing levels of physical activity are generally related to more positive outcomes (e.g., longevity), the most pronounced impacts on health are for those with very low levels of physical activity starting to do some activity. However, definitions of the required levels of physical activity in health recommendations tend to focus on much higher levels of required physical activity. In relation to a healthy diet, the situation may be even more complex given the mixed evidence about which components of diet (e.g., fat content) are important to which health outcome. Smoking and binge drinking may be somewhat simpler in that health recommendations tend to focus on simply avoiding these behaviours. However, in both cases there may be complex relationships between components of the health behaviour and different health outcomes. For example, while regular binge drinking over prolonged periods of time may be related to reduced longevity and increased risk of cirrhosis of the liver, even single occasion binge drinking may be related to the occasional fatality but also to injuries and sexually transmitted infections. Similarly, in relation to smoking the health benefits of quitting smoking includes impacts on a range of diseases and is beneficial at any age. However, while for some diseases (e.g., heart disease) the risk of smoking can be reversed by quitting, for other diseases (e.g., lung cancer) the risk is approximately frozen at the time point when smoking stopped.

A final issue in relation to definition of health behaviours is the link to the estimates of prevalence. Obviously estimates of smoking rates will be higher if based on any compared to regular smoking. Of more consequence may be the application of definitions of health behaviours in health recommendation to different groups. For example, Rhodes et al. (2017) discuss how the WHO (2010) definitions used to classify adolescents (11-17 year olds are recommended to accumulate at least 60 minutes of moderate-to-vigorous physical activity every day) and adults (18-64 year olds are recommended to accumulate at least 150 minutes of moderate physical activity or 75 minutes of vigorous physical activity each week) as physically active or not may result in large variations in the proportions being classified as inactive (respectively 81% vs 23% classified as inactive globally). Rhodes et al. (2017) also note how the use of self-reported (26% classified as inactive) versus objective (86% classified as inactive) measures of physical activity results in dramatically different estimates of inactivity in Canadian adults. Similarly, West (2017) points out that the focus on daily, 7 day or 28 day prevalence of smoking and the inclusion of cigarillos or not compromises comparisons of smoking data across countries. In addition, Kuntsche et al. (2017) comment on the problems of making comparisons between countries when the countries differ in the average amount of alcohol in a served unit or standard drink (varying between 6 and 12 grams of pure ethanol) and the period over which recall is requested (from 7 days to 12 months). They further note that what is defined as a binge may need to differ for men versus women.

Given the impact of a range of health behaviours on health outcomes one might expect there to be detailed information available on who performs what health behaviours and how this varies across different segments of the population. Unfortunately, although there is a growing body of research that details variations in health behaviours across the population, there is also considerable unevenness in the data and its availability. A lot more is known about the distribution of behaviours such as smoking (West, 2017) and physical activity (Rhodes et al., 2017) than about binge drinking (Kuntsche et al., 2017) and healthy diet (de Ridder et al., 2017). The surveillance of health

behaviours using standard definitions and measures across countries (as is being explored in the EU) could contribute to furthering our understanding of both the determinants and consequences of these behaviours. Such data would allow researchers to make better comparisons across countries or time points in addition to exploring more specific information on differences by type of behaviour, and to explore variations by demographic variables such as gender, age, ethnic group, education and socioeconomic status. However, such comparisons of data across countries are dependent on common approaches to defining and measuring health behaviours. Unfortunately we are some way from such common approaches in relation to diet (de Ridder et al., 2017) and binge drinking (Kuntsche et al., 2017) although we may be somewhat closer in relation to smoking (West, 2017) and physical activity (Rhodes et al., 2017).

There is also considerable variation across countries in the collection of such data. For example, in the USA the Centers for Disease Control collects and produces regular summaries for health behaviours such as smoking, alcohol consumption, physical activity, and diet (Centers for Disease Control, 2013). Similarly, the UK Data Service (www.ukdataservice.ac.uk) provides access to a number of key surveys which provide overview data for a range of health behaviours across the UK population (e.g., General Lifestyle Survey) or more detailed information on specific cohorts often followed at regular intervals (e.g., Longitudinal Study of Young People in England). The data collected and made publically available for other countries is much more varied and in many cases more limited, particularly for third world countries. A single, publically available location bringing together the most recent data from different nations on who performs various health behaviours would be an invaluable resource to researchers working in this area. Such a resource would be considerably more valuable if based on consistent definitions of each health behaviour.

Key Determinants of Health Behaviours

A great deal of health psychology research has examined the psychological determinants of health behaviours (e.g., Conner & Norman, 2015a). A number of general models of such

determinants have been developed including the health belief model (HBM; e.g. Becker, 1974; Janz & Becker, 1984; for a recent review see Abraham & Sheeran, 2015); protection motivation theory (PMT; e.g. Maddux & Rogers, 1983; Van der Velde & Van der Pligt, 1991; for a recent review see Norman et al., 2015), self-determination theory (SDT; e.g. Deci & Ryan, 2002; for a recent review see Hagger & Chatzisarantis, 2015), theory of reasoned action/theory of planned behaviour (TRA/TPB; e.g. Fishbein & Ajzen 2010; Ajzen 1991; for a recent review see Conner & Sparks, 2015); and social cognitive theory (SCT; e.g., Bandura, 1982, 2000; for a recent review see Luszczynska & Schwarzer, 2015). These models contain a number of common determinants including intentions, self-efficacy, outcome expectancies, perceived susceptibility and perceived severity (Conner & Norman, 2015b). Importantly, these models focus on determinants that are common across different health behaviours although they assess the magnitude of their impact in different behaviours and populations (Fishbein & Ajzen, 2010).

The four reviews of individual health behaviours included in this themed issue (smoking: West, 2017; binge drinking: Kuntsche et al., 2017; healthy diet: de Ridder et al., 2017; physical activity: Rhodes et al., 2017) highlight that while there may be some overlap in key determinants across behaviours there is also a number of factors unique to each behaviour. Considering those determinants that overlap, motivation and self-efficacy were highlighted as key determinants of healthy diet, binge drinking and physical activity, while social influences (injunctive and descriptive norms, social support) and attitudes or expectancies were highlighted as key determinants of binge drinking, smoking and physical activity. Socioeconomic status and gender were highlighted as key determinants of smoking and physical activity; the environment for healthy diet and binge drinking; and impulsivity for binge drinking and smoking. Considering those determinants that may be unique to each behaviour, knowledge, habit, automatic and affective influences, and emotions were highlighted as determinants of a healthy diet; while addiction, mental health problems, weak academic orientation, and drinking alcohol were highlighted as determinants of smoking; ethnicity

and good health status were highlighted as determinants of physical activity. These findings illustrate the importance of both common and unique determinants of different health behaviours. In relation to models of the key determinants of health behaviours, the reviews also illustrate how those employing general models may fail to assess the impact of determinants that are unique to an individual behaviour.

Effectiveness of Interventions to Change Health Behaviours

Numerous interventions to change health behaviours have been reported in the literature, as outlined in the reviews included in this themed issue. However, these interventions have typically produced only small sized effects (d = .30) on targeted health behaviours. For example, Rhodes et al. (2017) estimated that the average effect size of interventions to change physical activity in adults was only d = 0.27, and only d = 0.30 in adolescents. Considering specific types of interventions for reducing binge drinking, motivational interviewing has been found to have a small sized effect (d = 0.21) on the frequency of binge drinking in adolescents (under the age of 19) (Kohler & Hofmann, 2015). Similarly, providing college students with gender-neutral (d = 0.29) and gender-specific (d = 0.28) personalised normative feedback has also been found to have a small sized effect on alcohol consumption (Dotson, Dunn, & Bowers, 2015). The typically small effects sizes on health behaviour highlight the need for systematic programmes of research to develop more effective interventions. Nonetheless, even small positive effects, if maintained, have the potential to impact on long-term health outcomes. For example, an extra portion of fruit or vegetables per day may reduce the risk of ischemic stroke by 6% (Joshipura et al., 1999). Similarly, West (2007) argued that even small effects in smoking cessation interventions can have a high levels of clinical significance, due to the very large health gains that can be obtained from stopping smoking

All reviews noted that there is considerable heterogeneity in the effect sizes found for interventions to change health behaviour, which might suggest the presence of potential moderators

of intervention effectiveness. However, as noted by Rhodes et al. (2017), few reliable moderators of intervention effectiveness have been identified in meta-analyses. For example, there is little evidence to suggest that study quality, demographics, health status, clinical condition or weight status moderates the effectiveness of physical activity interventions. A positive interpretation of the lack of moderators is that it indicates the robustness of interventions to change physical activity, and other health behaviours, across different groups, settings, etc. Nonetheless, there is a strong case to be made for the need to continue to seek to identify potential moderators on the intervention effects, both within and across studies, as this will serve to increase our understanding of intervention effectiveness and contribute to the science of behaviour change. Four potential moderators worthy of further investigation are: the use of theory; behaviour change techniques; modes of delivery; and level/type of intervention.

The use of theory has been proposed to increase the effectiveness of interventions as such interventions are more likely to target the key modifiable determinants of health behaviour (Glanz & Bishop, 2010). There is some evidence that health behaviour interventions that are based on theory are more effective than those that are not (Prestwich, Webb, & Conner, 2015; Webb, Joseph, Yardley & Michie, 2010), although other reviews have concluded that they produce similar sized effects (Prestwich et al., 2014a). However, many so-called theory-based interventions are probably better classified as "theory-inspired" rather than "theory-based" (Hardeman et al., 2002; Michie & Abraham, 2004). More systematic programmes of research to develop and test theory-based interventions are required to advance the field.

Recent research has sought to classify the behaviour change techniques used in health behaviour interventions in order to identify the "active" (and inactive/redundant) ingredients of successful interventions. Rhodes et al. (2017) highlighted a cluster of behavioural techniques (e.g., goal setting, feedback on performance, self-monitoring) that were associated with larger effects in

physical activity interventions in adults. Similarly, in their review of online alcohol interventions, Black et al. (2016) reported that interventions that included prompting commitment or reviewing goals had larger effects on alcohol consumption whereas those interventions that provided information on the consequences of alcohol consumption had smaller effects. The identification of key behaviour change techniques has the potential to improve intervention design and effectiveness. However, the quality of the coding of interventions to identify constituent behavioural change techniques is dependent on the quality of the reporting of interventions, which is often sub-optimal (Ogden, 2016).

Interventions can be delivered via a range of modalities including face-to-face contact, print materials, online, text messaging, telephone calls, etc. Rhodes et al. (2017) found little evidence that mode of delivery moderated the effectiveness of physical activity interventions, although West (2017) noted that the chances of stopping smoking are highest when smokers use specialist face-to-face behavioural support (along with either varenicline or nicotine replacement therapy). Online interventions are typically found to have small, but significant, effects on health behaviour (Webb et al., 2010), in line with many health behaviour interventions delivered via other modalities. This is encouraging given that online interventions are, in comparison to face-to-face interventions, low-cost to deliver and can have a wide reach. As a result, they are more likely to be cost-effective (Tate et al., 2009).

Most health behaviour interventions published in journals such as Psychology & Health are targeted at individuals and seek to change the beliefs and skills that determine health behaviour. However, policy and environmental interventions may have a greater impact on health behaviour at a population level. For example, as Kunstche et al. (2017) note, increasing the price of alcohol (through minimum pricing legislation or increased taxation) is the most effective policy instrument to reduce alcohol consumption at a population level. West (2017) also highlight that increasing the

cost of smoking is likely to lead to reduced levels of smoking given that for every 10% increase in the cost there is a corresponding 4% decrease in the number of cigarettes purchased. Considering changes to the physical environment, Kunstche et al. (2017) highlight that there is some evidence that restricting alcohol sales on US college campuses, for example through reducing outlet density and hours of sales, can reduce student drinking. Similarly, de Ridder et al. (2017) note that making changes to the "choice architecture" such as the positional changes of food item placement (i.e., "nudging") can increase the probability of healthy eating choices. However, tests of such environmental interventions are often sub-optimal, highlighting the need for more systematic, experimental studies.

Future Directions for Research on Health Behaviours

There are a number of important issues for future research on smoking, physical activity, healthy diet and binge drinking, as highlighted in the reviews included in this themed issue. Here we draw attention to three more general issues for future research on health behaviours: basis of interventions; changing multiple behaviours; and maintenance of behaviour change.

First, considering the basis of interventions, recent developments in the design of health behaviour interventions have emphasized the importance of classifying intervention components (i.e., behaviour change techniques; Michie et al., 2013) and mapping these intervention components on to mechanisms of change. Relatedly, using theory to develop health behaviour interventions has been advocated by some (Prestwich et al., 2017) as it provides a useful framework for identifying the key modifiable determinants of health behaviour, designing interventions to target these determinants and accumulating evidence. Some reviews have reported that the use of theory is associated with larger changes in health behaviour (Prestwich et al., 2015), although other reviews have concluded that theory-based interventions and interventions that do not use theory produce similar effect sizes (Prestwich et al., 2014a). The lack of stronger effects for theory-based interventions may be due

issues around poor reporting of theory, poor application of theory or just poor theories (Prestwich et al., 2015); future research should therefore be mindful of such issues. One common criticism of attempts to use theory to develop health behaviour interventions is that while they specify what should be changed (i.e., the theoretical constructs) to change behaviour, they typically do not specify how to change these constructs. Accordingly, recent reviews have started to identify the best means of changing specific theoretical constructs such as self-efficacy (e.g., Olander, Fletcher, Williams, Atkinson, Turner & French, 2013; Prestwich et al., 2014b) and social influences (Prestwich, Kellar, Conner, Lawton, Gardner, & Turgut, 2016). These efforts may help to identify evidence-based techniques to change theoretical constructs and thereby increase the effectiveness of theory-based interventions.

Second, the majority of research on health behaviours focuses on individual health behaviours; this need not be the case. Health behaviours have various similarities (McEachan et al., 2010) and knowledge about the determinants or how to change one behaviour may generalize to other similar behaviours. More importantly health behaviours are not completely independent and there may be potential in interventions designed to improve health by simultaneously targeting more than one behaviour for change. Multi-behaviour interventions have been suggested as a practical way to improve overall health outcomes. A recent review of multi-behaviour interventions in the domains of smoking, diet and physical activity (Wilson et al., 2015), concluded that interventions targeting a moderate number of recommendations produced the highest level of change. The review also concluded that interventions targeting change in a single behaviour may be more appropriate in shorter interventions. In contrast, in their review of online health behaviour interventions, Webb et al. (2010) reported that interventions that targeted multiple health behaviours had smaller effects on health behaviour than those targeting single health behaviours. The focus on multiple health behaviours may dilute intervention effects on individual health behaviours. Gaining a better understanding of the value of individual versus multi-behaviour health interventions would be a

useful direction for research in this area. For example, recent research (Conner et al., 2016) has suggested that prioritizing changing one health behaviour over another may lead to stronger intention-behaviour relationships which, in turn, may increase the impact of interventions designed to change behaviour through targeting intentions. This would suggest that interventions designed to change a single behaviour through increasing the strength of intentions to engage in that behaviour may be more effective if individuals are additionally encouraged to prioritize that behaviour change goal over other competing goals.

Third, a greater focus is needed on the maintenance of health behaviour. Although a single session of binge drinking can lead to adverse health outcomes, like smoking, physical activity and a healthy diet, the health outcomes are principally associated with maintenance over prolonged time periods. Much of the research on the determinants of these behaviours or interventions to change them has been focused on initiation or short-term performance and not the maintenance of behaviour change over prolonged periods of time. A greater understanding is required of the factors determining maintenance of health behaviour; it is likely that these will be different from the factors important in the initiation of health behaviour. In addition, although the health benefits of maintenance behaviours may be most strongly associated with consistent performance over prolonged time periods, interruptions or lapses may be common for these behaviours (e.g., healthy eating; Conner & Armitage, 2002). Hence, an appropriate focus may be on performance over prolonged time periods that minimises lapses (Shankar et al., 2004) or ensures that lapses do not become full-blown relapses. Norman and Conner (2015) provide a brief review of models that have been applied to understanding the maintenance of health behaviours. They note the key role of continuing motivation and self-efficacy in several maintenance models and the need to develop an integrated model. More recently, Kwasnicka et al. (2016) reviewed over 100 theories of behaviour change maintenance and highlighted the differential nature and impact of motives, self-regulation, resources (psychological and physical), habits, and environmental and social influences in the

initiation and maintenance of health behaviour. Voils et al.'s (2014) conceptual model of behaviour initiation and maintenance represents a promising first step in relation to developing an integrated model as it outlines different determinants of the initiation (e.g., outcome expectancies, action self-efficacy, action planning) and maintenance (e.g., satisfaction with outcomes, recovery self-efficacy, relapse prevention planning) of health behaviour. Further long-term studies could help us gain a better and deeper understanding of the maintenance of health behaviours. Given the importance of maintenance to health outcomes this should be a key focus for health behaviour research that really contributes to improving health outcomes.

Conclusions

The study of the determinants of health behaviour and interventions to change health behaviours has the potential to make an important contribution to efforts to improving health. The current themed issue of Psychology & Health brought together state of the art reviews of four key health behaviours; namely, smoking, binge drinking, healthy diet, and physical activity. As well as providing detailed reviews of research on the impacts on health, prevalence, key determinants, and effectiveness of interventions, for each of these behaviours, the reviews also highlighted a number of common issues in relation to work on health behaviours including: the importance of clear definitions when considering links with health outcomes and when estimating prevalence; the importance of focusing on the key determinants of health behaviours, some of which may be common across different health behaviours; and the need to develop more effective interventions to change health behaviours, given that current interventions typically produce small sized effects. Finally, the reviews highlighted a number of key directions for future research, including: making links between evidence-based behaviour change techniques and the underlying mechanisms of change outlined in theories of health behaviour; exploring the potential of targeting multiple health behaviours; and identifying the characteristics of interventions that increase their effectiveness, such

as the theory base, use of behaviour change techniques, mode of delivery and target level/type (e.g., individual, policy, environment).

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