

**BRIEF REPORT*****THE FINANCIAL NEED QUESTIONNAIRE: BEHAVIORAL AND PSYCHOMETRIC SUPPORT FOR THE ASSESSMENT OF FINANCIAL NEED IN MONETARY REINFORCEMENT RESEARCH***

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Michael (1982) proposed the establishing operation concept, which refers to events, operations, or conditions that enhance the reinforcing value of a stimulus and increase the frequency of behaviors that lead to this stimulus as a consequence. A parallel concept, abolishing operation, is an event, operation, or condition that decreases the reinforcing value of a stimulus and decreases the frequency of behaviors that lead to this stimulus as a consequence (Michael, 1982). Typically, deprivation functions as an establishing operation and satiation functions as an abolishing operation.

Several non-human research studies (Clark, 1958; Segal, 1959; Dale & Roberts, 1986) have demonstrated the effects of deprivation and satiation on operant responding. Satiation is associated with failure to respond (Reese & Hogenon, 1962), whereas deprivation is associated with increased response rates (Boren, 1959) and decreased sensitivity to reinforcement contingencies (Lewis & Dougherty, 1992; Powell, 1973).

In basic non-human research, food-deprivation levels are quantified as percent of free-feeding body weight or number of hours since last access to food. In human research, some

researchers have employed methods to discover variables that might influence the effectiveness of reinforcers. For example, Dougherty, Cherek, and Roache (1994) administered alcohol breathalyzer and urine tests to screen for medicinal and street drug use that could affect the participant's response to operant contingencies. In another study, DeGrandpre, Bickel, Rizvi, and Hughes (1993) conducted a choice experiment in which participants earned cigarette puffs. DeGrandpre et al. selected only cigarette smokers as participants, and instructed participants to abstain from smoking 6 hours prior to the study. To ensure that participants were cigarette-deprived, the researchers administered a carbon monoxide (CO) breath test upon the participant's arrival at the research lab.

DeGrandpre et al. (1993) also explored the effects of manipulating financial variables. Specifically, the researchers allotted each participant a set income (i.e., amount of money to spend on cigarette puffs earned during each session). When a participant earned a cigarette puff, they could choose their preferred cigarette brand or a less-preferred brand, which was valued at 1/5 the cost of the preferred brand. The cost of each earned puff was subtracted from the participant's allotted income. Level of income was manipulated across several sessions. When income was high, participants chose to inhale puffs of the preferred brand. When income was low, participants chose less expensive brands. Thus, financial variables can affect the type of stimuli that can function as reinforcers.

Although DeGrandpre et al. (1993) and Dougherty et al. (1994) have advanced the assessment of establishing operations in human research, a draw-back of urine screening and breath testing is the financial investment required to purchase equipment and supplies. Moreover,

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these indices of establishing operations are relatively specific to drug and alcohol research.

Monetary reinforcement is used in a broad range of human research areas. Unfortunately, researchers employing monetary rewards typically make an unsupported assumption that money is a generalized reinforcer, is of equal value, and functions in the same manner for every participant. Variability in participant behavior may be due in part to differences in the motivational value of the rewards employed. If the reinforcing value of monetary rewards (i.e., financial need) can be quantified in advance of the experimental procedure, then one can establish the potential effectiveness of monetary rewards for each participant.

The purpose of the present study was to develop a scoring system, gather normative data, and examine the reliability and validity of a self-report questionnaire that was designed to assess financial need of undergraduate students who participate in monetary reinforcement research. The questionnaire was originally used by Madden and Perone (1999) to screen and select participants for an operant reinforcement study.

#### PHASE 1: PSYCHOMETRIC SUPPORT

The purpose of Phase 1 was to gather normative data, develop an empirically-derived scoring system, assess test-retest reliability, and examine construct validity for the Financial Need Questionnaire (FNQ) using a large sample of participants.

##### *Empirically-Derived Scoring System*

*Participants.* A sample of 567 undergraduate students enrolled in a West Virginia University (WVU) introductory psychology course participated in phase 1. Participants were 301 females and 264 males aged between 17 and 43 years ( $M = 19$ ,  $SD = 2.41$ ). Ethnic/racial information was given by 547 participants as follows: Caucasian, 88.5%; Asian, 3.5%; African-American, 3%; Hispanic, 1%; and Bi-racial, less than 1%.

*Measure.* The Financial Need Questionnaire (FNQ) is an 8-item, multiple-choice questionnaire, which assesses current living expenses and spending habits relevant to undergraduate students.

*Procedure.* The FNQ was distributed to students in 14 introductory psychology sections. Students completed the FNQ either before or after

their regularly scheduled class meeting. In addition to the 8 FNQ items, students also provided a rating of overall level of financial need ("Overall, how would you describe your level of financial need? How much do you need money?"). This item was rated on an 11-point-scale, with 0 being none and 10 being extreme financial need.

*Results.* Scoring of the FNQ was empirically-derived. As shown in Table 1, for each item, the alternatives are scored from 0 to 3 based on the rank of the overall financial need rating (0 to 10), derived from the average overall financial need rating (0 to 10) of participants who endorsed that alternative. For example, for item 1 ("Where do you live?") participants who endorsed alternative "(a) At home with parents" reported an average financial need rating of 5.35, which is the lowest average need among the alternatives. Thus, alternative "a" is scored as 0 whereas alternative "(c) in a fraternity/sorority house" is scored as 3 because participants who endorsed alternative c had an average financial need score of 6.56, the highest financial need among the alternatives. Likewise, alternative "(b) In a WVU residence hall" is scored as 1 because participants, on average, who endorsed this alternative reported the second lowest overall financial need rating, and alternative "(d) In a house/apartment" is scored as 2 because participants, on average, who endorsed this alternative reported the second highest overall financial need rating. The number of participants who endorsed each alternative is shown in Table 1.

By summing scores for each of the 8 items, the total FNQ score can range from 1 to 24, with higher scores corresponding to higher levels of financial need. As shown in Figure 1, FNQ total scores were normally distributed with obtained scores ranging from 4 to 19, and a mean score of 10.75 ( $SD = 3.02$ ). There were no gender

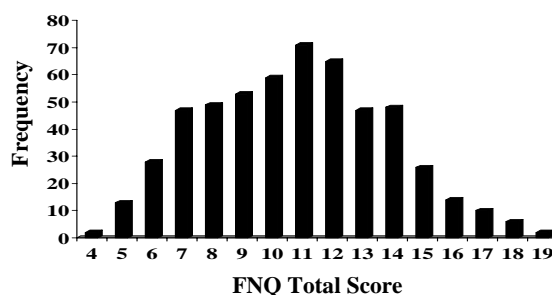


Figure 1

Table 1

Financial Need Questionnaire (FNQ) items, alternatives, and scoring as well as average financial need and number of participants who endorsed each alternative

Item	Alternative	Score	Mean Need Rating	<i>N</i>
1. Where do you live?	(a) At home with parents.	0	5.35	48
	(b) In a university residence hall.	1	5.82	307
	(c) In a fraternity/sorority house.	3	6.56	16
	(d) In a house/apartment.	2	5.97	194
2. How are your living expenses (rent, food, entertainment, etc.) paid?	(a) Mostly by parents.	0	5.47	299
	(b) Mostly by scholarship, parents pay the rest.	1	5.56	48
	(c) Mostly by yourself.	2	6.49	150
	(d) Mostly by scholarship, you pay the rest.	3	6.59	49
3. How are your university expenses (books, tuition, fees, etc.) paid?	(a) Mostly by parents.	1	5.70	291
	(b) Mostly by scholarship, parents pay the rest.	0	5.07	88
	(c) Mostly by yourself.	2	6.45	114
	(d) Mostly by scholarship, you pay the rest.	3	6.64	67
4. During an average week, how often do you eat at a restaurant?	(a) Never eat out.	3	6.08	39
	(b) Less than 3 times.	2	5.90	333
	(c) 3 - 7 times.	1	5.74	181
	(d) Almost all meals.	0	5.64	11
5. When you eat out, how much do you usually spend?	(a) Less than \$5.	3	6.17	94
	(b) \$5 to \$10	2	5.81	394
	(c) More than \$10	1	5.68	72
6. How often do you have pocket money to buy simple things?	(a) Never.	3	7.41	17
	(b) Sometimes, but there are days when I am broke.	2	6.33	220
	(c) Usually.	1	5.70	204
	(d) Always.	0	5.07	123

Table 1

*(Continued)*

Item	Alternative	Score	Mean Need Rating	N
7. On weekends, if you want to, how often do you have money to go out?	(a) Never.	3	7.00	7
	(b) Sometimes, but sometimes I have to stay home.	2	6.77	150
	(c) Usually.	1	5.77	275
	(d) Always.	0	4.89	132
8. Are you employed?	(a) Yes.	1	5.96	165
	(b) Yes, Federal Work-Study Position	3	6.82	67
	(c) No. I don't have a job but I am looking for one.	2	6.24	178
	(d) No. I don't have a job and I am <u>not</u> looking for one.	0	4.88	152

differences on FNQ scores. There was not enough racial diversity in the sample to examine racial differences.

#### *Test-Retest Reliability*

Test-retest reliability was examined to assess the temporal stability of the FNQ.

*Participants.* Participants were 28 undergraduate students from one of the introductory psychology classes included in the development sample, described above. Participants included 15 females and 13 males, aged 18 to 34 years ( $M = 19$ ,  $SD = 3.12$ ). Information about ethnic/racial groups was reported as follows: Caucasian, 96.4% and African-American, 3.6%.

*Procedure.* After a 17-day interval, the FNQ was re-administered to students before their scheduled class period. Students who completed both FNQ administrations earned 2 extra credit points toward their psychology course.

*Results.* The relation between FNQ score obtained at each administration was examined using a Pearson product moment correlation, yielding a coefficient of  $r = .90$ ,  $p < .001$ . Results show that the FNQ demonstrates good test-reliability.

#### *Construct Validity*

Construct validity was examined to determine how well the FNQ measures the construct of financial need. Convergent evidence of construct validity was gathered by examining the relation between FNQ scores and other financial need measures.

*Participants.* Fifty-six undergraduate students participated. Participants were recruited from two WVU introductory psychology classes that were not included in the FNQ development sample. Questionnaires were completed anonymously and demographic information was not reported.

*Procedure.* The FNQ, described above, was administered along with a financial information questionnaire to assess savings, debt, and surplus money. On the financial information questionnaire, participants listed the amount of money invested in various types of savings accounts (i.e., savings, Christmas club, certificate of deposit, bonds, stock or mutual funds, money market, and other). Participants also listed the amount of money owed for various types of debt (i.e., student loans, credit cards, personal loans, unpaid bills, mortgage, and other). Finally, participants responded to the question, "At the end of the month, after you have paid for what

you need (food and rent, etc.) and want (entertainment, etc.), how much money do you typically have left over?"

The FNQ and the financial information questionnaire were distributed before the regularly scheduled class meeting, and participants were instructed to complete the questionnaires at home and to refer to their financial records as needed. The questionnaires were collected at the beginning of each class meeting during a 1-week period following their initial distribution. Each participant earned 2 points of extra credit toward their psychology course.

*Results.* The mean total FNQ score of 10.6 ( $SD = 2.99$ ) is consistent with the mean score obtained from the development sample. Results reveal that FNQ total scores relate to debt ( $r = .36, p < .008$ ), but not savings ( $r = -.18, ns$ ) or surplus money ( $r = -.20, ns$ ).

## PHASE 2: BEHAVIORAL SUPPORT

In addition to the evidence of reliability and validity described above, it is also important to assess predictive validity to determine if a participant's FNQ score can predict reinforcement schedule performance. In the present phase, we assessed the relationship between FNQ score and mixed fixed ratio (FR) differential reinforcement of low rate (DRL) schedule responding to determine if FNQ scores were related to points earned, response rate, and sensitivity to changing schedules of reinforcement. We hypothesized that participants with higher FNQ scores, compared to low scores, would earn less points, respond at higher response rates and be less sensitive to contingency changes. This hypothesis is based on non-human research findings showing that food deprivation is associated with high response rates and less sensitivity to changing contingencies (Boren, 1959; Lewis & Dougherty, 1992; Powell, 1973).

*Participants.* Twenty-seven Introductory Psychology undergraduate students qualified for participation. FNQ scores ranged from 3 to 17 ( $M = 11.12, SD = 3.77$ ). Qualification criteria included completion of no other college-level psychology course work and no previous or current participation in behavior analysis/operant research. Data from one outlier participant was excluded due to the participant's extremely efficient schedule responding and a suspicion that

the participant was not naïve to the scheduled contingencies. Participants were 16 females and 10 males, aged 17 to 23 years ( $M = 19, SD = 1.66$ ). Information about ethnic/racial groups was reported as follows: Caucasian, 84.6%; Asian, 7.7%; and African-American, 7.7%. Participants earned one cent per point, based on their operant schedule performance. To compensate participants for their time and to encourage attendance, participants received extra credit points toward their psychology course.

*Apparatus.* All sessions were conducted in a 3-m x 6-m research lab in the Department of Psychology at West Virginia University. Participants were seated at a desk that supported a Hewlett Packard Pavilion computer with color monitor and a keyboard. A Visual Basic program executed on the computer controlled the experimental procedure, and data were stored in a Microsoft Access database.

*Procedure.* Informed consent was obtained, and the participants completed the FNQ. Afterward, participants responded to an operant schedule (see below) for 80 min, with a 10-min break after the first 40 min. Participation lasted for approximately 2 h. Participants were paid at the end of the session. Before participating in the operant task, participants were instructed to read the followed typed copy of the instructions:

I am about to participate in a computer activity in which I have the opportunity to earn points worth cash. My job is to earn as many points as possible. Each press of the space bar is an attempt to earn a point. Some presses may produce points and some may not. When I do earn a point, the monitor screen will display a message box for 3 seconds that says, "You scored. Press Enter." When I see that box, I must hit enter immediately to record the point. It is important to hit enter immediately because only recorded points count towards the cash prize. If I have any questions, I should alert the experimenter now.

During the activity, participants were seated in front of the computer monitor. Space bar presses produced points on a mixed FR 32 DRL 6-s schedule. A mixed schedule was selected because it is more difficult to discriminate than less complex reinforcement schedules thereby increasing the likelihood that schedule performance could be explained more by variability in FNQ score than by simplicity of the task.

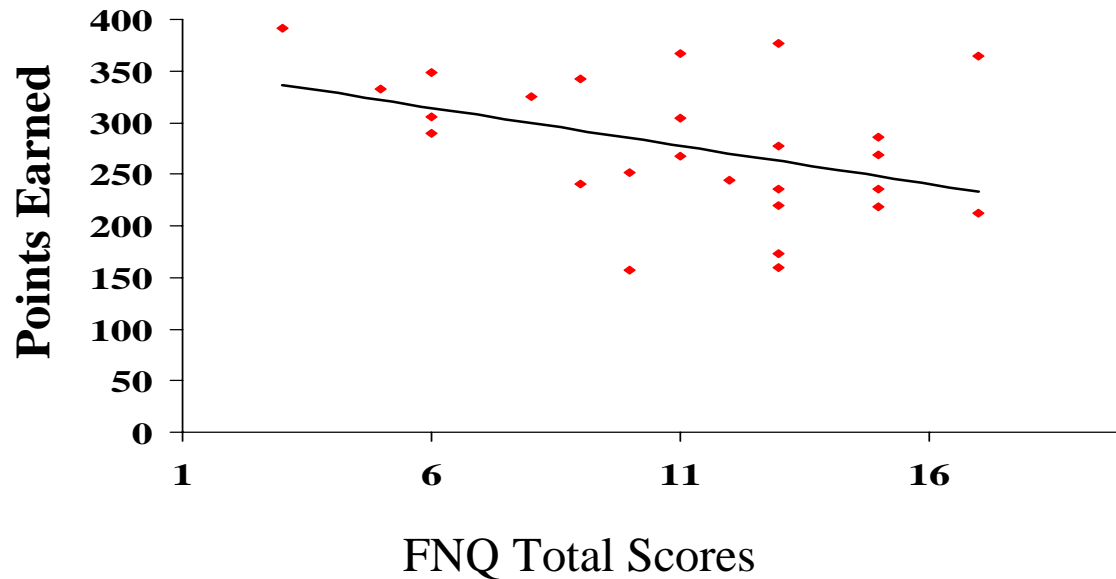


Figure 2

The mixed FR DRL schedule provided points, worth one cent each, for every 32 spacebar presses when the FR schedule was in effect and for every lapse of at least 6-s between presses when the DRL schedule was in effect. The space bar had to be pressed and released to register as a response.

The initial component was selected randomly each session. The FR and DRL components alternated every 2 min, with no stimulus to denote the schedule change. The computer screen remained dark blue throughout the session, except when a message box appeared to indicate "Point Earned." During the appearance of this box, the participant was required to make a consummatory response by hitting the "enter" key on the computer keyboard within a 3-s limited hold. A "Point Recorded" message was displayed for 1 s following engagement in the consummatory response.

Nine of the 26 participants (34 %) earned no points in the DRL component. For these participants, a mixed FR Extinction schedule was the functional contingency in effect. Likewise, 2 of the 26 participants (7 %) did not earn points in the FR component. For these participants, a mixed DRL Extinction schedule was the functional contingency in effect.

*Results.* As shown in Figure 2 a Pearson product moment correlation analysis yielded a coefficient of  $r = -.42$ ,  $p < .03$  between FNQ score

and points earned on the mixed schedule. FNQ scores accounted for 17 % of variance in points earned. Figure 2 also shows that high-FNQ scorers tended to show more within-group variability in points earned than low-FNQ scorers.

Figure 3 shows responses per minute for the FR and DRL components across FNQ scores. Responses per minute reflect average response rate across 20 components of each schedule. In the calculation of responses per minute, consummatory response time was subtracted from the 40 min of schedule exposure. Although not statistically significant, there was a trend for low-FNQ scorers to respond at higher rates than high-FNQ scorers in both components.

To determine how effectively participants discriminated between the two components (i.e. responded fast during FR and slow during DRL), a discrimination ratio was calculated for each pair of FR and DRL components. The discrimination ratio was calculated as responses per minute in FR divided by total responses per minute for the pair of components (FR plus DRL). Again, consummatory response time was subtracted in the calculation of responses per minute. Discrimination ratios of .50 reflect equal responding in both components, suggesting no discrimination. Ratios greater than .50 reflect more responding in the FR component whereas ratios

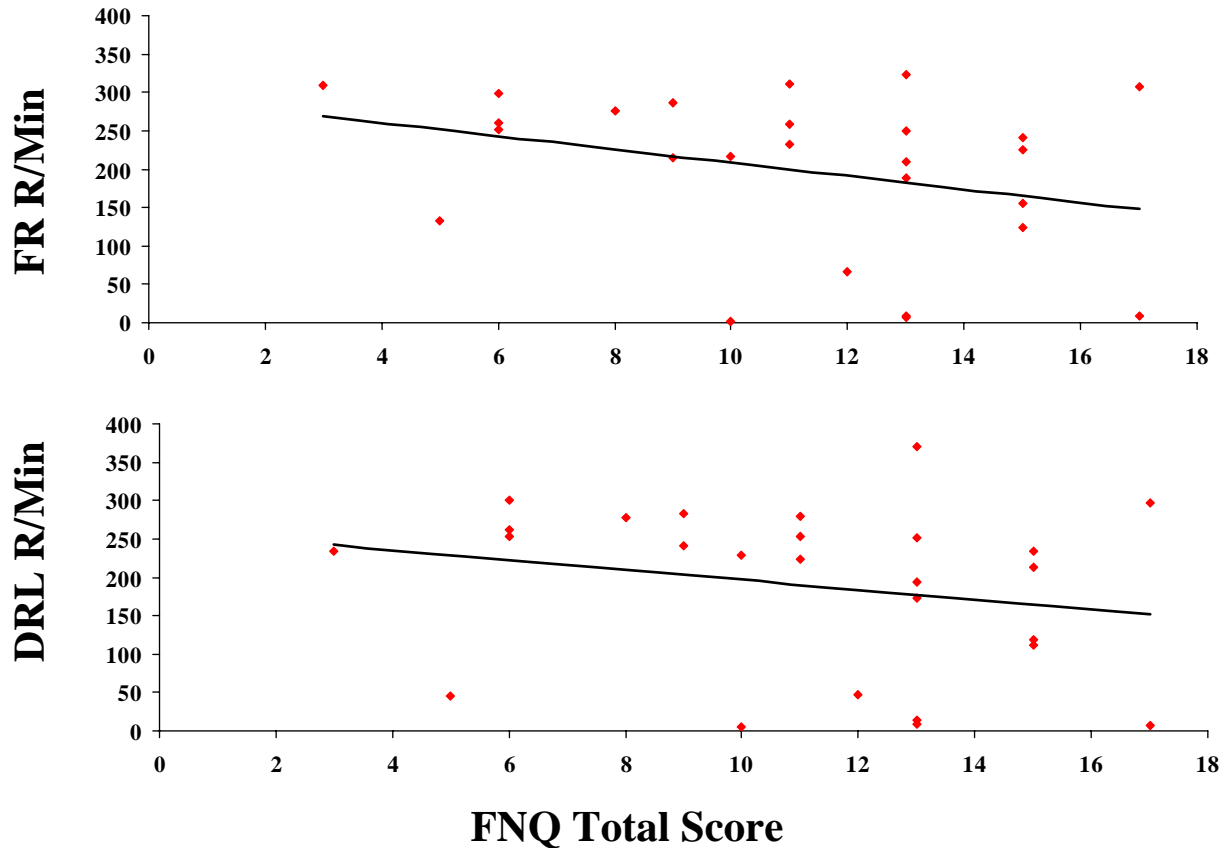


Figure 3

less than .50 reflect more responding in the DRL component.

Figure 4 shows the relation between FNQ score and mean discrimination ratio, which is the average ratio across all 20 pairs of components. A bivariate correlational analysis shows that FNQ scores were unrelated to ability to discriminate between schedules, as measured by the mean discrimination ratio across all 20 pairs of components ( $r = -.13, ns$ ) as well as mean discrimination ratio across the final 10 pairs of components ( $r = -.25, ns$ ). On average, the mean discrimination ratio was .50, with mean ratios ranging from .29 to .65. Overall, participants failed to discriminate the mixed schedule and most participants responded at high rates throughout both components.

#### DISCUSSION

The Financial Need Questionnaire (FNQ) is an 8-item measure of financial need in undergraduate

students who participate in monetary reinforcement research. It can be administered within 5 min, is easily scored, and based upon an empirically-derived scoring system. Psychometric data suggest that FNQ scores are normally distributed. Scores range from 1 to 24, with higher scores reflecting greater financial need. Scores obtained from the development sample ranged from 4 to 19, suggesting that the FNQ has a solid basal and ceiling, meaning there is room in the scoring to detect the most extreme low and high need students. The FNQ demonstrates good temporal stability and shows a strong relationship with reported debt.

Behavioral data show that FNQ scores were negatively correlated with points earned on a mixed FR DRL schedule. However, FNQ score was not related to response rates and discrimination ratio. Thus, it is possible that the FNQ is not a useful predictor of human schedule

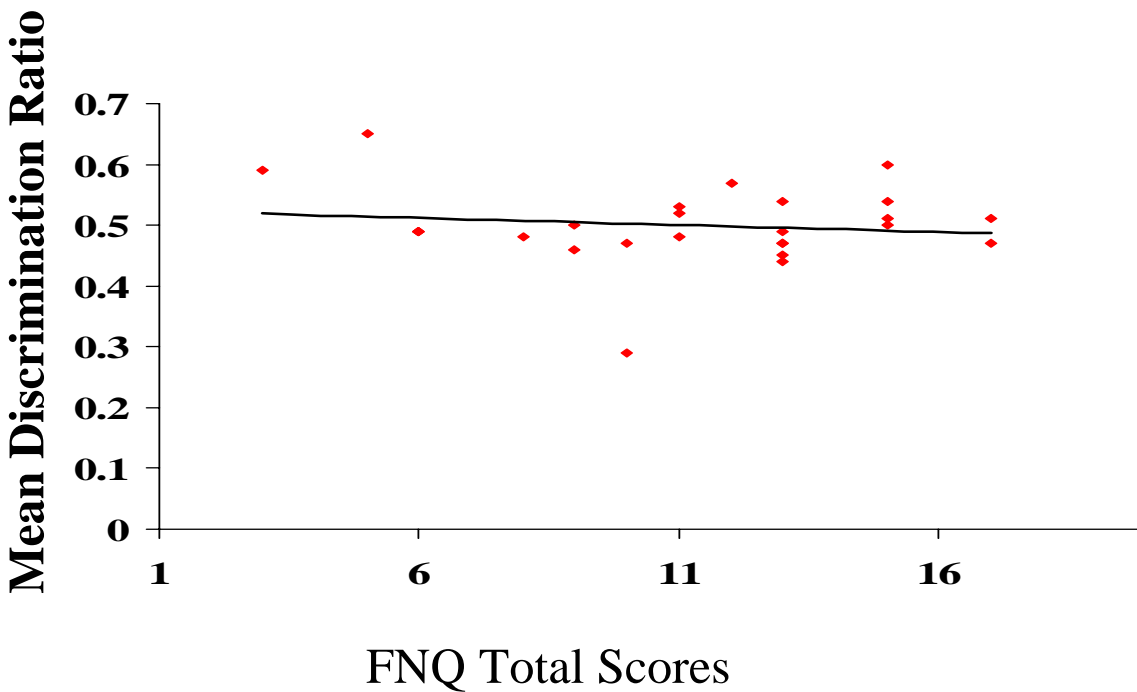


Figure 4

sensitivity. However, although not statistically significant, the negative correlation between FNQ score and discrimination ratio was in the direction of the hypothesis that high FNQ scorers would discriminate less efficiently than low FNQ scorers. Finally, FNQ score was unrelated to response rate.

The finding that low FNQ scorers earned more monetary reinforcers and tended to discriminate better than high FNQ scorers is consistent with the finding that declines in a pigeon's body weight are associated with less sensitivity to a variable-interval (VI) schedule with an omission contingency (Lewis & Dougherty, 1992). The finding that FNQ score was unrelated to response rate is not consistent with the non-human finding that longer periods of food deprivation are associated with higher responses rates during an extinction component of a multiple VI Extinction schedule (Powell, 1973).

One interpretation of the findings is that financial need/debt may not be an establishing operation. Instead, the FNQ is related to debt, which may function as an abolishing operation to decrease the reinforcing value of money. In a non-human analogue, this would be similar to a rat earning food pellets that are consumed by a "debt collector" rat in an adjoining chamber. Another

interpretation of the findings is that debt does not abolish money as a reinforcer, but instead establishes the reinforcing value of high rates of earning. In the present study, earnings were relatively small ( $M = \$2.77$ ), compared to earnings that could have been obtained from a higher-paying job. A final interpretation of the findings is that factors related to high debt may contribute to poorer schedule performance. For example, high debt may be associated with increased stress, poor sleep hygiene, or inadequate nutrition.

The possible influence of financial need on operant performance is one reason for basic researchers to consider using the FNQ to assess financial need in monetary research with undergraduate participants. In single-subject designs, FNQ scores can provide additional information about the participant's history. In between-group designs or replication failures, FNQ scores can be used to examine individual differences. To reduce inter-group motivational differences, participants can be counterbalanced by FNQ scores across conditions.

A final reason to use the FNQ is that this measure is not intrusive. The West Virginia University Institutional Review Board (IRB) approved FNQ administration without comment.

The IRB, however, was reluctant to approve more direct measures of savings/debt/surplus funds. The IRB was concerned about confidentiality and data security issues that may arise if participants are asked to explicitly list how much money they owe or have saved. Although IRBs regulations vary among institutions, this anecdotal report suggests that the less direct nature of the FNQ may ease ethical concerns that arise from gathering highly personal financial information from participants. Also, FNQ scoring is less face valid than more direct measures of financial need, and participants may be less likely to distort FNQ responses.

Future research might examine the relation between FNQ scores and attrition. Our initial purpose in developing the FNQ was to identify undergraduates who reported high financial need because we assumed that high-need individuals would be more likely to maintain participation in monetary reinforcement research. The relation between FNQ scores and attrition remains an important empirical question. Initial research has found that 3 out of 4 high FNQ scorers attended more than 100 sessions in a monetary reinforcement study in which participants earned an average of \$4.18 per hour by participating in sessions conducted five days per week (Madden & Perone, 1999). Assessment measures that predict how likely an individual will maintain participation in an operant study may facilitate the research process and enable researchers to decrease the number of drop-outs, especially in studies that require participants to return for an extended period of time.

Future research should explore the relation between FNQ scores and operant performance on other types of reinforcement schedules, especially choice procedures, with varying amounts of monetary reinforcer magnitude. In addition, future research should examine how the reinforcing value of money relates to monetary fluctuations, such as paydays, billing due dates, or weekends.

Finally, it is important to recognize that financial need is only one type of establishing operation relevant to human research. Valid and reliable measures of sleep, intellectual functioning, and drug use will provide a more complete picture of a human participant's history and the antecedent conditions that can affect human behavior.

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